STATE OF COLORADO

John W. Hickenlooper, Governor
Christopher E. Urbina, MD, MPH
Executive Director and Chief Medical Officer

Dedicated to protecting and improving the health and environment of the people of Colorado

4300 Cherry Creek Dr. S.
Denver, Colorado 80246-1530
Phone (303) 692-2000
Located in Glendale, Colorado

http://www.cdphe.state.co.us

Laboratory Services Division
8100 Lowry Blvd.
Denver, Colorado 80230-6928
(303) 692-3090

Colorado Department
of Public Health
and Environment

January 29, 2014

Sabrina Forrest
Site Assessment Manager
U.S. Environmental Protection Agency
1595 Wynkoop Street, 8EPR-B
Denver, CO 80202-1129

Subject: Letter Report: London Mine (EPA ID# CO0000286203), Park County, Colorado

Dear Sabrina,

The London Mine has been the subject of Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Site Assessment activities and is currently under Notice of Violations / Cease and Desist Orders with the Colorado Department of Public Health and Environment (CDPHE) – Water Quality Control Division (WQCD) regarding two Colorado Discharge Permits associated with the Site. Currently, its status on Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) is No Further Remedial Action Planned (NFRAP) (as of December 17, 2010). This letter report summarizes the history of this Site and recommends to the U.S. Environmental Protection Agency (U.S. EPA) that no further assessment is needed at this time.

Site Background

The London Mine Site (LMS) is located in the headwaters of South Mosquito Creek, approximately 4 miles west of the Town of Alma in Park County, Colorado, at an elevation ranging from 11,000 feet above mean sea level (msl) to 12,400 feet above msl (refer to Figures 1and 2, included as Attachment 1). Mining and milling operations have been intermittently active at the LMS since 1875. The LMS is divided into three segments: 1) the South Mosquito Creek (SMC), 2) Upper Mosquito Creek (UMC), and 3) Lower Mosquito Creek (LMC) areas.

1) The SMC area encompasses a 2 ½-mile long by ¾-mile wide (1.9 square miles) valley between the London and Pennsylvania mountains. The LMS (London Butte [Water Tunnel] and London Extension Tunnel mines) are in this valley. The SMC drainage, which includes the No Name Creek tributary, runs northeasterly in the alpine valley towards the Mosquito Gulch to join Mosquito Creek (MC). The SMC is listed as an impaired water body under section 303(d) of the Clean Water Act and is designated a 'Use Protected', with the following classifications: 'Aquatic Life Cold 1, Recreation E, Water Supply, and Agriculture'. The sources identified within the SMC area include the London Mine Butte discharge, the London Extension Mine Water Discharge, the London Extension Mine Dump, the London Mine Historic Mill Tailings, and the

Butte Tunnel Mine Rock Dump.

2) The UMC area covers the 3 ½-mile long by ¾-mile wide (2.6 square miles) valley from the headwaters of MC down to the SMC/MC confluence junction between the London and Loveland mountains. The sources identified within the UMC area include the Champaign, the North London Mine Dump, and the North London Mine Mill Tailings.

3) The LMC area is a 4-mile long by 1-mile wide (4 square miles) valley along the Mosquito Gulch starting from the SMC/MC confluence junction and continuing eastward to the Middle Fork South Platte River. The sources identified within the LMC area include the Montgomery-Alma/Betts Mill Tailings, the Orphan Boy Mine Rock Dump, unnamed dumps, and the Hock Hocking Mine Rock dumps.

The most recent mining activities at the LMS were in 1981-91. In 1980, a Mined Land Reclamation Permit M-1980-250 was issued for modern mining and milling operations at the LMS. In 1997, at the request of the London Mine Limited Liability Company (LLC), the Colorado Mined Land Reclamation Board revoked the permit and forfeited the $12,000 reclamation bond. The title to the surface and mineral rights of the mining claims at the LMS was held by Mr. Ben L. Wright. The LMS is now operated by the Estate of Ben Wright (former London Mine Manager) on behalf of London Mine, LLC (the "Estate").

The London Butte Mine Water Tunnel operates under a Colorado Discharge Permit System (CDPS) Permit Number CO-0038334 through the CDPHE-WQCD. The facility consists of a treatment works for an underground mining operation that is no longer in operation. Contributing wastewater sources at the facility include mine water and groundwater conveyed through the London Butte Mine Water Tunnel. The facility treats mine related wastewater from the tunnel portal through a sedimentation pond. The permit authorizes London Mine, LLC to discharge treated wastewater from the facility through the outfall associated with the final sedimentation pond (Outfall 001A) and into South Mosquito Creek. The final sedimentation pond receives water directly from the tunnel portal. Since 2006, the Water Tunnel discharge has consistently exceeded certain effluent limitations outlined in the Permit (i.e., metals (Cadmium and Zinc), pH, total suspended solids). As a result of the exceedances, the Division issued a Notice of Violation/Cease and Desist Order, Number IO-090715-1 to London Mine, LLC on July 15, 2009, with the expectation that London Mine, LLC engage in efforts to ensure compliance with the Permit by no later than March 31, 2010. As of today, the facility is still not in compliance with the Permit. Additionally, the CDPHE-WQCD sent another Notice of Violation/Cease and Desist Order, Number IO-130321-1 to London Mine, LLC on March 21, 2013.

The London Mine Extension Tunnel operates under a CDPS Permit Number CO-0045209 through the CDPHE-WQCD. The mine waste treatment process consists of a collection system inside the mine adit, followed by cement kiln dust addition equipment, and a lined settling pond. Overflow from the settling pond (Outfall 001) discharges to No Name Creek, while the cement kiln dust and metals settle out in the pond. The CDPHE-WQCD issued a Compliance Order on Consent, Number IC-12051401 on May 18, 2012 to London Mine, LLC regarding Prairie Center Metropolitan District No. 9. The Estate replied to this Compliance Order on Consent as follows:

> "The London Mine, LLC and THF Prairie Center Development, LLC (THF/Prairie) are parties to a Stipulation entered into before the Colorado Water Quality Control Commission in 2004. The Stipulation addresses the operation and maintenance of the Extension Tunnel Treatment Plant (the "Facility"). The Stipulation provides that "THF shall provide for continued operation and maintenance of the Extension Tunnel Treatment Plant to treat water discharged from the London

> Mine via the Extension Tunnel." Moreover, under Prairie's Permit No. CO-0045209, THF/Prairie's duty extends to the "collection system inside the mine adit," i.e., the Extension Tunnel. It is THF that has the obligation and duty to maintain and operate the Extension Tunnel and the Facility. For more than a year, exceedances under the London Permit have been measured. These exceedances have been troubling to the Estate for many reasons, not least of which is the fact that the water known to be discharged under the London Permit through the Water Tunnel was clean, not requiring treatment under the Stipulation before it is discharged. The Stipulation only required treatment of the water discharged from the Extension Tunnel under the Prairie permit. The London Mine, LLC has been actively looking into what the potential cause of these effluent limitation exceedances may be, including exploring technical resources for assessing the situation. From investigations conducted to date, which include guidance received from technical consultants, the London Mine, LLC understands that the water that should be discharged from the Extension Tunnel to the Facility for treatment is unfortunately being diverted to the London Mine Water Tunnel. The Estate and the London Mine, LLC have been advised that the diversion of the Extension Tunnel water to the Mine Water Tunnel is a result of damage to the Extension Tunnel caused in connection with THF's past operations at the London Mine. Because the Extension Tunnel water is not discharging to the Facility and therefore has not been treated, when it comingles with the Mine Water Tunnel water it results in the Water Tunnel effluent limitations exceedances. We believe this unauthorized discharge and/or unauthorized bypass of the Extension tunnel water into the Mine Water Tunnel is a violation of the Prairie Center Metropolitan District No. 1 Permit."

Ms. Kelly Morgan, an Enforcement Specialist with the Clean Water Compliance & Enforcement Unit of the CDPHE-WQCD, stated that because THF/Prairie previously purchased some of the water rights from London Mine, LLC, THF/Prairie agreed to hold the Colorado Discharge Permit associated with the Extension Tunnel (i.e., CDPS Permit Number CO-0045209) and entered into this stipulation with London Mine, LLC and CDPHE-WQCD, which was executed in 2004. According to Ms. Morgan, in response to the Compliance Order on Consent (Number IC-12051401) issued to London Mine, LLC and THF/Prairie on May 18, 2012, THF/Prairie performed upgrades to their treatment process so that when/if discharge does occur again in the future from the Extension Tunnel, the effluents would not exceed the discharge permit standards. Ms. Morgan also stated that the associated sedimentation pond associated with the Extension Tunnel has been filled in and above ground tanks are now in place to collect any effluent before being treated and discharged to No Name Creek. Because there has been no discharge from the Extension Tunnel in over two years (since August 2011), and because of the upgrades performed since the issue of the Compliance Order, the CDPHE-WQCD closed the Compliance Order in October 2013.

With regard to the Notice of Violation/Cease and Desist Order issued on March 21, 2013 to London Mine, LLC for the London Butte Mine Water Tunnel, this violation/order is still open and London Mine, LLC is still in non-compliance. According to Ms. Morgan, London Mine, LLC is not currently trying to remedy the effluent exceedances. Ms. Morgan stated that the London Mine, LLC still blames the responsibility of these exceedances from the Water Tunnel on THF/Prairie because of the damage in the Extension Tunnel. Per a letter from the General Manager of London Mine, LLC to the CDPHE-WQCD, dated October 31, 2013, London Mine, LLC stated:

> "As you know, THF/Prairie Center holds the Extension Tunnel discharge permit while the London Mine, LLC holds the Water Tunnel discharge permit. Within the inner London mine workings there is a water raise that is a conduit between the Extension Tunnel and the Water Tunnel. The water from the Extension Tunnel (THF) is carried by the water raise and mixes with the water in the Water Tunnel (London Mine LLC). The reason why the water from the

Extension Tunnel flows down the water raise into the Water Tunnel is due to cave-ins and severe degradation of the Extension Tunnel. Were it not for the severe degradation of the Extension Tunnel, the water would not flow down the water raise and instead would be treated at the THF water treatment facility. However, the comingled water from the Water Tunnel is then discharged from the Water Tunnel pursuant to the London Mine water permit" (London Mine LLC Letter, 2013).

Please refer to this London Mine, LLC letter (Attachment 2) for further pertinent information. In addition, London Mine, LLC has reportedly told the CDPHE-WQCD that they do not have money to fix the problem and that they are actively trying to sell the property. Ms. Morgan stated that the CDPHE-WQCD has requested financial information from London Mine, LLC to back up their financial claims, but has yet to receive this information from London Mine, LLC. According to Ms. Morgan, the CDPHE-WQCD has scheduled a hearing for liability issues with London Mine, LLC on March 17-19, 2014 in order to find a potential resolution in regard to the Notice of Violation/Cease and Desist Order issue.

Previous CERCLA Investigations

In 1995, the CDPHE conducted a Preliminary Assessment (PA), with a subsequent Site Inspection (SI) conducted in 1996.

Solid Source sample analytical results collected during the previous SI are summarized in the following table (Table 1). The table shows concentrations of 14 out of 23 metals analyzed in the nine solid source samples were significantly higher than those found in the background soils. In addition, eight of these 14 metals in the nine solid source samples were above an EPA SCDM benchmark.

Table 1 - London Mines/Mosquito Creek Basin Solid Source Samples (concentrations in milligrams per kilogram [mg/kg])

Analyte	Average Background	3x Background	Average Source	Highest Source	**SCDM Benchmark**	Location of Highest Source
Antimony	2.55	7.65	10.19	41.50	0.54 (Ref. Dose Screen Conc.)	SO-03 North London Mine Rock Dump (UMC)
Arsenic	7.60	22.80	32.96	177.00	0.41 (Ref. Dose Screen Conc.) 0.0021 (Cancer Risk Screen Conc.)	SO-03 North London Mine Rock Dump (UMC)
Barium	128.05	384.15	376.56	1,630.00	95 (Ref. Dose Screen Conc.)	SO-04 American-Alma Mill Tailing (UMC)
Cadmium	0.91	2.73	18.99	111.00	0.68 (Ref. Dose Screen Conc.)	SO-13 Montgomery-Alma/Betts Mill Tailing (LMC)
Calcium	5,480.50	16,441.50	19,146.07	33,300.00	Analyte Not Listed	SO-14 Orphan Boy Mine Rock/Mill Tailing (LMC)
Cobalt	4.10	12.30	4.24	13.90	No SCDM Benchmark Listed	SO-03 North London Mine Rock Dump (UMC)
Copper	11.60	34.80	298.70	1,050.00	No SCDM Benchmark Listed	SO-03 North London (UMC) Mine Rock Dump
Iron	12,025.00	36,075.00	55,662.22	138,000.00	No SCDM Benchmark Listed	SO-03 North London Mine Rock Dump (UMC)
Lead	75.35	226.05	6,403.00	35,300.00	No SCDM Benchmark Listed	SO-13 Montgomery-Alma/Betts Mill Tailing (LMC)
Magnesium	1,782.00	5,346.00	4,754.22	11,700.00	Analyte Not Listed	SO-04 American-Alma

						Mill Tailing (UMC)
Manganese	364.00	1,092.00	722.34	3,100.00	190 (Ref. Dose Screen Conc.)	SO-07 Butte Tunnel Mine Rock/Mill Tailing (SMC)
Mercury	0.14	0.42	1.24	3.00	1.0 (FDAAL)	SO-14A OppS Orphan Boy Mine Rock/Mill Tailing (LMC)
Silver	0.56	1.68	28.80	99.20	6.8 (Ref. Dose Screen Conc.)	SO-14 Orphan Boy Mine Rock/Mill Tailing (LMC)
Zinc	123.45	370.35	3,014.48	18,000.00	410 (Ref. Dose Scren Conc.)	SO-13 Montgomery-Alma/Betts Mill Tailing (LMC)

Shaded yellow where concentrations meet HRS criteria for an observed release.

Aqueous Source sample analytical results collected during the previous SI are summarized in Table 2 below. The discharge from the London Extension Mine (SO-08) showed significant concentrations of barium, cadmium, calcium, cobalt, copper, iron, magnesium, manganese, nickel, potassium, sodium, and zinc, which appear to be directly reflected in the higher concentrations of these same metals downstream on the No Name Creek at SO-10. The analytical data from these samples are almost identical, which indicate that the sedimentation pond may not have any cleansing effect. The London Butte Mine Drainage sample SO-09 contains high concentrations of barium, calcium, copper, magnesium, manganese, nickel, potassium, sodium, and zinc, which may contribute to the increased concentrations of these same metals in South Mosquito Creek at SW-15. The increased concentrations of these metals at SW-15 may also be attributable to the solid sources from the London Mine Historic Mill Tailing (SO-11) and the London Extension Mine rock dump (SO-12).

Table 2 – London Mines/Mosquito Creek Basin Aqueous Source Samples (concentrations in micrograms per liter [µg/L])

Sample Location	**LONDON EXTENTION MINE DRAINAGE**	**LONDON BUTTE MINE DRAINAGE**
Sample I.D.	**SO-08**	**SO-09**
Date of Collection	**1996 SI**	**1996 SI**
Hardness	197.88	203.51
Calcium Total Concentration	69500	34500
Magnesium Total Concentration	5910	28500
Barium Dissolved Concentration	13.8	41.6
Barium Total Concentration	14.4	42.6
Barium MCL	2000	2000
Barium Ground Water/Surface Water Pathway - Drinking Water (Ref. Dose Screen Conc)	2600	2600
Cadmium Dissolved Concentration	111	U
Cadmium Total Concentration	114	U
Cadmium TVS Chronic	0.71	0.72
Cadmium TVS Acute (Trout)	3.09	3.16
Cadmium MCL	5.0	5.0
Cadmium Ground Water/Surface Water Pathway - Drinking Water (Ref Dose Screen Conc.)	18.0	18.0
Cadmium Surface Water Pathway - Environmental (Acute CMC Fresh)	2.0	2.0

Cadmium Surface Water Pathway - Environmental (Chronic CCC Fresh)	0.25	0.25
Copper Dissolved Concentration	76.6	3
Copper Total Concentration	759	3.6
Copper TVS Chronic	16.05	16.44
Copper TVS Acute	25.57	26.25
Copper MCL	1300	1300
Copper Surface Water Pathway - Environmental (Acute CMC Fresh)	13	13
Copper Surface Water Pathway - Environmental (Chronic CCC Fresh)	9	9
Iron Dissolved Concentration	1060	U
Iron Total Concentration	34700	U
Iron Chronic (Total Recoverable)	1000	1000
Iron Surface Water Pathway - Environmental (Chronic CCC Fresh)	1000	1000
Manganese Dissolved Concentration	1730	32
Manganese Total Concentration	1800	33.8
Manganese TVS Chronic	2070.65	2090.09
Manganese TVS Acute	3747.78	3782.97
Manganese Ground Water/Surface Water Pathway - Drinking Water (Ref. Dose Screen Conc.)	5.1	5.1
Nickel Dissolved Concentration	68.7	3.4
Nickel Total Concentration	68.5	U
Nickel TVS Chronic	92.64	94.87
Nickel TVS Acute	834.10	854.14
Nickel Ground Water/Surface Water Pathway - Drinking Water (Ref. Dose Screen Conc.)	730	730
Nickel Surface Water Pathway - Environmental (Acute CMC Fresh)	470	470
Nickel Surface Water Pathway - Environmental (Chronic CCC Fresh)	52	52
Zinc Dissolved Concentration	25500	556
Zinc Total Concentration	26300	553
Zinc Chronic (Total Recoverable)	220	220
Zinc Ground Water/Surface Water Pathway - Drinking Water (Ref. Dose Screen Conc.)	11000	11000
Zinc Surface Water Pathway - Environmental (Acute CMC Fresh)	120	120
Zinc Surface Water Pathway - Environmental (Chronic CCC Fresh)	120	120

Table Value Standard (TVS) based on dissolved concentrations. Shaded yellow where concentrations meet HRS criteria for an observed release. U = not detected.

Aqueous Surface Water sample analytical results collected during the previous SI are summarized in Table 3 below. Analytical results indicated that elevated metals concentrations in the Mosquito Creek Basin included cadmium, copper, manganese, selenium, and zinc. Surface water samples in the main stream Upper Mosquito Creek (i.e., Main stream samples SW-01, 03, 07, and 08; Tributary samples SW-02, 04, and 06) generally exhibited lower analyte concentrations than those found in the South Mosquito (i.e., Main stream samples SW-09, 10, 14, and 15; Tributary samples SW-12 and 13) and Lower Mosquito creeks (i.e., Main stream samples SW-17, 18, and 19; Tributary samples SW-34 OppS).

A summary of the surface water analytical results by stream segment are as follows:

- Upper Mosquito Creek: Elevated total and dissolved zinc concentrations were exhibited downstream from the main stream Upper Mosquito Creek wetland and fishery areas.
- South Mosquito Creek: Total and dissolved metals concentrations were generally higher than those found in Upper Mosquito Creek. The most downstream aqueous sample taken from the main South Mosquito Creek showed the highest total metals concentration for copper (6.70 µg/L), lead (45.20 µg/L), and manganese (40.00 µg/L). High dissolved and total metals concentrations were found in the London Extension Mine drainage sample for barium, cadmium, calcium, copper, iron, magnesium, manganese, nickel, sodium, and zinc. Total zinc concentrations in aqueous samples ranged from 20.10 µg/L to 332 µg/L, with the highest total zinc concentration of 562 µg/L detected in a sample collected downstream of the mine on No Name Creek tributary. In addition, the total cadmium concentration in this sample was 1.80 µg/L. Sediment samples generally exhibited lower analyte concentrations than in the Upper Mosquito creek except for cadmium and zinc.
- Lower Mosquito Creek: Though at lower concentrations, the same analytes found with elevated concentrations in the South Mosquito Creek were reflected in the main stream of the Lower Mosquito Creek.
- Middle Fork South Platte River: None of the release aqueous samples from the Middle Fork South Platte River exhibited high dissolved metal concentrations except for copper, which was elevated in the Middle Fork South Platte River wetland and fishery below the Sacramento Creek. Although below AWQC standards, zinc total metals concentrations were also elevated starting in the wetlands below the Pennsylvania Creek and down below the Sacramento Creek. For total metals in the sediment samples, elevated concentrations were indicated for arsenic, silver, and sodium.

Table 3 – London Mines/Mosquito Creek Basin Aqueous Surface Water Samples (concentrations in micrograms per liter [µg/L])

Analyte & TVS/SCDM Benchmarks	Average Background	Average Value Elevated Release Sample	# Elevated Release Samples	Highest Release Value	Location Highest Release Sample
Hardness	17.68	84.84	---	---	---
Calcium Total Concentration	2653.33	21000	2/19	27500.00	SW-34 OppS Orphan Boy/Cooper Creek
Magnesium Total Concentration	2683.33	7868.33	6/19	13600.00	SW-34 OppS Orphan Boy/Cooper Creek
Cadmium Dissolved Concentration	1.00	1.90	1/19	1.90	SW-13 No Name Creek
Cadmium Total Concentration	1.00	1.53	3/19	1.80	SW-13 No Name Creek
Cadmium TVS Chronic	0.11	0.37	---	0.37	---
Cadmium TVS Acute (Trout)	0.38	1.48	---	1.48	---
Cadmium MCL	5.0	5.0	---	5.0	---

Cadmium Ground Water/Surface Water Pathway - Drinking Water (Ref Dose Screen Conc.)	18.0	18.0	---	18.0	---
Cadmium Surface Water Pathway - Environmental (Acute CMC Fresh)	2.0	2.0	---	2.0	---
Cadmium Surface Water Pathway - Environmental (Chronic CCC Fresh)	0.25	0.25	---	0.25	---
Copper Dissolved Concentration	1.00	4.57	6/19	19.20	SW-34 OppS Orphan Boy/Cooper Creek
Copper Total Concentration	1.00	2.91	8/19	6.70	SW-15 London Historic Mill Tail
Copper TVS Chronic	2.04	7.78	---	7.78	---
Copper TVS Acute	2.63	11.51	---	11.51	---
Copper MCL	1300	1300	---	1300	---
Copper Surface Water Pathway - Environmental (Acute CMC Fresh)	13	13	---	13	---
Copper Surface Water Pathway - Environmental (Chronic CCC Fresh)	9	9	---	9	---
Iron Dissolved Concentration	61.67	517.00	1/19	517.00	SW-34 OppS Orphan Boy/Cooper Creek
Iron Total Concentration	38.57	252.00	2/19	274.00	SW-15 Below London Historic Mill Tailings
Iron Chronic (Total Recoverable)	1000	1000	---	1000	---
Iron Surface Water Pathway - Environmental (Chronic CCC Fresh)	1000	1000	---	1000	---
Manganese Dissolved Concentration	4.96	32.16	7/19	110.00	SW-34 OppS Orphan Boy/Cooper Creek
Manganese Total Concentration	8.33	23.76	8/19	40.00	SW-15 Below London Historic Mill Tailings
Manganese TVS Chronic	926.13	1561.68	---	1561.68	---
Manganese TVS Acute	1676.26	2826.56	---	2826.56	---
Manganese Ground Water/Surface Water Pathway - Drinking Water (Ref. Dose Screen Conc.)	5.1	5.1	---	5.1	---
Selenium Dissolved Concentration	5.00	NA	---	---	SW-15 Below London Historic Mill Tailings
Selenium Total Concentration	5.00	5.60	2/19	5.70	SW-02 Tributary from Oliver Twist Mine
Selenium TVS Chronic	4.6	4.6	---	4.6	---
Selenium TVS Acute	18.4	18.4	---	18.4	---

Selenium MCL	50	50	---	50	---
Seleniium Ground Water/Surface Water Pathway - Drinking Water (Ref. Dose Screen Conc.)	180	180	---	180	---
Selenium Surface Water Pathway - Environmental (Chronic CCC Fresh)	5.0	5.0	---	5.0	---
Zinc Dissolved Concentration	11.07	208.23	14/19	1180.00	SW-34 OppS Orphan Boy/Cooper Creek
Zinc Total Concentration	10.37	183.12	12/19	562.00	SW-13 No Name Creek
Zinc Chronic (Total Recoverable)	220	220	---	220	---
Zinc Ground Water/Surface Water Pathway - Drinking Water (Ref. Dose Screen Conc.)	11000	11000	---	11000	---
Zinc Surface Water Pathway - Environmental (Acute CMC Fresh)	120	120	---	120	---
Zinc Surface Water Pathway - Environmental (Chronic CCC Fresh)	120	120	---	120	---

Table Value Standard (TVS) based on dissolved concentrations. Shaded yellow where concentrations meet HRS criteria for an observed release.

Based on CDPHE's SI, EPA determined in 1998 that the area was a high priority for further assessment based on:

- Source Areas totaling 23 acres of tailings, 250,000 cubic yards of mine related sources and draining adits;
- Releases of multiple metals to wetlands and a fishery above SCDM benchmarks;
- A segment of fishery gone due to contamination;
- The potential presence of threatened and endangered species; and
- Elevated concentrations of several metals that were found in ground water used for drinking water, when compared to available background.

In 2010, EPA determined that no further remedial action was warranted at the Site due to "significant water treatment work being performed by other parties, including the owners and State of Colorado Division of Reclamation Mining and Safety." Thus, the Site was given a no further remedial action planned (NFRAP) determination and was archived from the CERCLIS database. Archived sites may be returned to the CERCLIS site inventory if new information necessitating further Superfund consideration is discovered.

Refer to Attachment 3 summarizing records/file reviews conducted as part of this Letter Report from the CDPHE – Hazardous Materials and Waste Management Division, the CDPHE-WQCD, and the Colorado Division of Reclamation, Mining and Safety (DRMS).

Current Activities/Data

DRMS conducted tailings reclamation at the LMS in the summer of 2013 due to South Mosquito Creek failing to meet applicable standards for zinc, iron, manganese, and cadmium. Based on a project summary provided by the DRMS, the LMS contains three mill tailings piles and a number of waste rock piles that are immediately adjacent to South Mosquito Creek. In the spring, the creek significantly erodes the tailings piles which leach acidic, metal-laden water and sediment into the creek. When the mining permit was revoked in 1997, at the request of London Mine, LLC, they forfeited the $12,000 reclamation bond which was used by DRMS to partially stabilize portions of the tailings, but were significantly insufficient to complete reclamation of the overall site to applicable performance standards. Based on information received from DRMS in March 2013, DRMS planned to implement the tailings reclamation project as follows:

> "The London tailings reclamation can most efficiently be completed over two construction seasons, in 2013 and 2014. Site investigations indicate that tailings fill the natural bed of South Mosquito Creek, and that the creek has been relocated to route along the north edge of the tailings. The preferred reclamation alternative for the London tailings 2013 project area includes removal of tailings adjacent to the relocated creek down to creek level and consolidation into the impoundment constructed in the 1980s (known as the "Elephant Trap"). The consolidated tailings will then be banked against the north flank of Pennsylvania Mountain to maximize separation of the tailings from the relocated creek. Structural fill imported to the project area from permitted gravel sources at or near Alma or Fairplay will be placed over tailings as capping material and to maintain the relocated creek in its current configuration, and plant growth medium will be applied over the cap. A mix of wetland, riparian, and upland vegetation zones will be established in the excavated area and over the consolidated and capped tailings."

Based on more recent discussions with DRMS in December 2013, DRMS stated the following regarding the 2013 work season:

> "[DRMS] started the project this summer [2013] and McCollum's Excavating was the selected contractor to do the work. The project work involved removing tailings material adjacent to South Mosquito Creek down to creek level, consolidating the tailings into the impoundment (referred to as the "Elephant Trap"), excavated cover material from designated borrow locations and placement of cover materials over the reclaimed area. [DRMS] hauled in some biosolids and plant growth medium to be incorporated into the soil. Because of the winter weather conditions, incorporating the biosolids/plant growth medium and revegetation will occur in the spring of 2014. In addition, [DRMS] [has] a separate project that will include wetland restoration along South Mosquito Creek and the reconstructed drainage channels in 2014. [DRMS] also did a bit of tailings removal in the London Butte area that was impacted by a large landslide two years ago. The remaining work on the Butte Tailings area will take place in 2014. We will develop a reclamation plan this winter and put it out for bid next spring."

DRMS does not have any sampling data to share at this time. Refer to Attachment 4 for DRMS's initial project summary packet.

The self-monitoring effluent data collected by London Mine, LLC from May 2009 to January 2013, regarding CDPS Permit Number CO-0038334 (Water Tunnel), exceed the effluent limitations imposed by Part I.A.1 of the Permit as follows:

- Total Suspended Solids: Max 7 Day Average Limit = 20 mg/L (***Result = <50***)
  30 Day Average Limit = 20 mg/L (***Result = <50***)
- pH: Minimum Limit = 6.5 S.U. (***Result = 6.23 and 6.4***)
- Zinc (potentially dissolved): Max 7 Day Average Limit = 1,300 µg/L
  (***Result = 1,400 to 4,910***)
  85th Percentile of 24 Month Rolling Average Limit = 654 µg/L
  (***Result = 1,377.5 to 2,967***)
- Cadmium (potentially dissolved): 30 Day Average Limit = 3.2 µg/L (***Result = 3.8 to 14.9***)

Ms. Morgan of the CDPHE-WQCD provided the following recent surface water monitoring data from South Mosquito Creek, which was conducted by Golder Associates, Inc.:

Date Sampled	Analyte (Dissolved Metal)	Result (µg/L)	State Table Value Standard (µg/L)
10/18/2012	Cadmium	***3.0***	0.74
	Zinc	***820***	280
11/14/2012	Cadmium	***2.3***	0.72
	Zinc	***600***	280
12/14/2012	Cadmium	***3.1***	0.74
	Zinc	***730***	280
01/09/2013	Cadmium	***2.5***	0.77
	Zinc	***870***	280
02/12/2013	Cadmium	***2.3***	0.77
	Zinc	***740***	280
04/25/2013	Cadmium	***3.2***	0.82
	Zinc	***740***	280
05/22/2013	Cadmium	***1.4***	0.49
	Zinc	***360***	280
06/05/2013	Cadmium	ND	0.31
	Zinc	***160***	280
07/10/2013	Cadmium	***1.4***	0.42
	Zinc	***320***	280
08/13/2013	Cadmium	***2.6***	0.66
	Zinc	***540***	280
09/11/2013	Cadmium	***2.1***	0.60
	Zinc	***490***	280

Conclusion and Recommendation

The LMS, owned by London Mine, LLC, was the subject of a Preliminary Assessment (1995) and Site Inspection (1996). Two CDPS Permits are associated with the LMS, including CDPS Permit Number CO-0038334 (London Mine Water Tunnel) and the CDPE Permit Number CO-0045209 (London Mine Extension Tunnel). A wastewater treatment facility has historically treated mine-related water discharging from the Extension Tunnel prior to discharging to No Name Creek and subsequently South Mosquito Creek, while water discharging from the Water Tunnel has historically been considered "clean". Since 2009 to the present, and due to damage in the Extension Tunnel from what London Mine, LLC claims happened from THF/Prairie's actions, water that would otherwise discharge from the Extension Tunnel has re-routed itself through the Water Tunnel discharge resulting in effluent exceedances in the Water Tunnel CDPS Permit. For approximately the last two years, effluent discharge has not occurred through the Extension Tunnel. The CDPHE-WQCD issued a Compliance Order on Consent to London Mine, LLC on June 18, 2012 regarding the CDPS Permit noncompliance with the Extension Tunnel. However, the CDPHE-WQCD closed this Compliance Order in October 2013 due to THF/Prairie performing upgrades to their treatment process so that when/if discharge occurs again in the future from the Extension Tunnel, the effluents would not exceed the discharge permit standards.

In addition, the CDPHE-WQCD issued a Notice of Violation/Cease and Desist Order to London Mine, LLC on March 21, 2013 regarding the CDPS Permit noncompliance with the Water Tunnel, which still currently stands. London Mine, LLC reportedly stated to the CDPHE-WQCD that they do not have the current funds to fix the problem and that they are actively trying to sell the property, in which the new property owner would be liable for fixing the effluent exceedances. The CDPHE-WQCD has scheduled a hearing for liability issues with London Mine, LLC on March 17-19, 2014 in order to find a potential resolution in regard to the Notice of Violation/Cease and Desist Order issue.

DRMS recently completed tailings reclamation work adjacent to South Mosquito Creek this past summer (2013) and consolidated the tailings into the previously constructed (i.e., 1980s) impoundment referred to as the "Elephant Trap", which is banked against the north flank of Pennsylvania Mountain. At the same time, DRMS also completed a bit of tailings removal in the London Butte area that was impacted by a large landslide two years ago. DRMS plans to complete the removal activities in the Butte Tailings area in 2014. In addition, DRMS plans to include wetland restoration along South Mosquito Creek and the reconstructed drainage channels in 2014.

Based on recent surface water data collected from South Mosquito Creek by Golder Associates, Inc. at the end of 2012 and to September 2013, concentrations of zinc and cadmium, while above State Table Value Standards for this stream segment, were similar or slightly higher than samples collected during the previous SI investigation. However, during the previous SI, none of the surface water samples collected from the Middle Fork South Platte River (further downstream and considered a fishery) exhibited high dissolved metal concentrations attributable to the LMS, which is still most likely the case based on this recently collected data.

Based on the continued tailings reclamation activities by DRMS in the spring and summer of 2014, and the current CDPHE-WQCD enforcement action activities with regard to the CDPS Permit associated with the Water Tunnel (i.e., scheduled court hearing on March 17-19, 2014), the CDPHE recommends that the CERCLIS designation of "No Further Remedial Action Planned" is applicable for the LMS, *at this time*, based on Other Cleanup Activity (OCA) occurring and that the Site should be maintained as archived. However, the CDPHE recommends obtaining the results/outcome of these future planned activities for the Site in order to identify the outcome of the upcoming court hearing and to confirm that current OCA efforts are successful before verifying if further Superfund consideration is warranted.

Please contact me at 303-692-3324 or alissa.schultz@state.co.us if you have any questions.

Sincerely,

Alissa Schultz
Environmental Protection Specialist
Hazardous Materials and Waste Management Division
Colorado Department of Public Health and Environment

Attachments
1: Figure 1 and 2
2: London Mine, LLC Letter (October 2013)
3: Summary of Records/File Review
4: DRMS Project Summary

References

CDPHE (HWWMD), July 22, 1995, *Preliminary Assessment – London Mines/Mosquito Creek Basin – Park County, Colorado*.

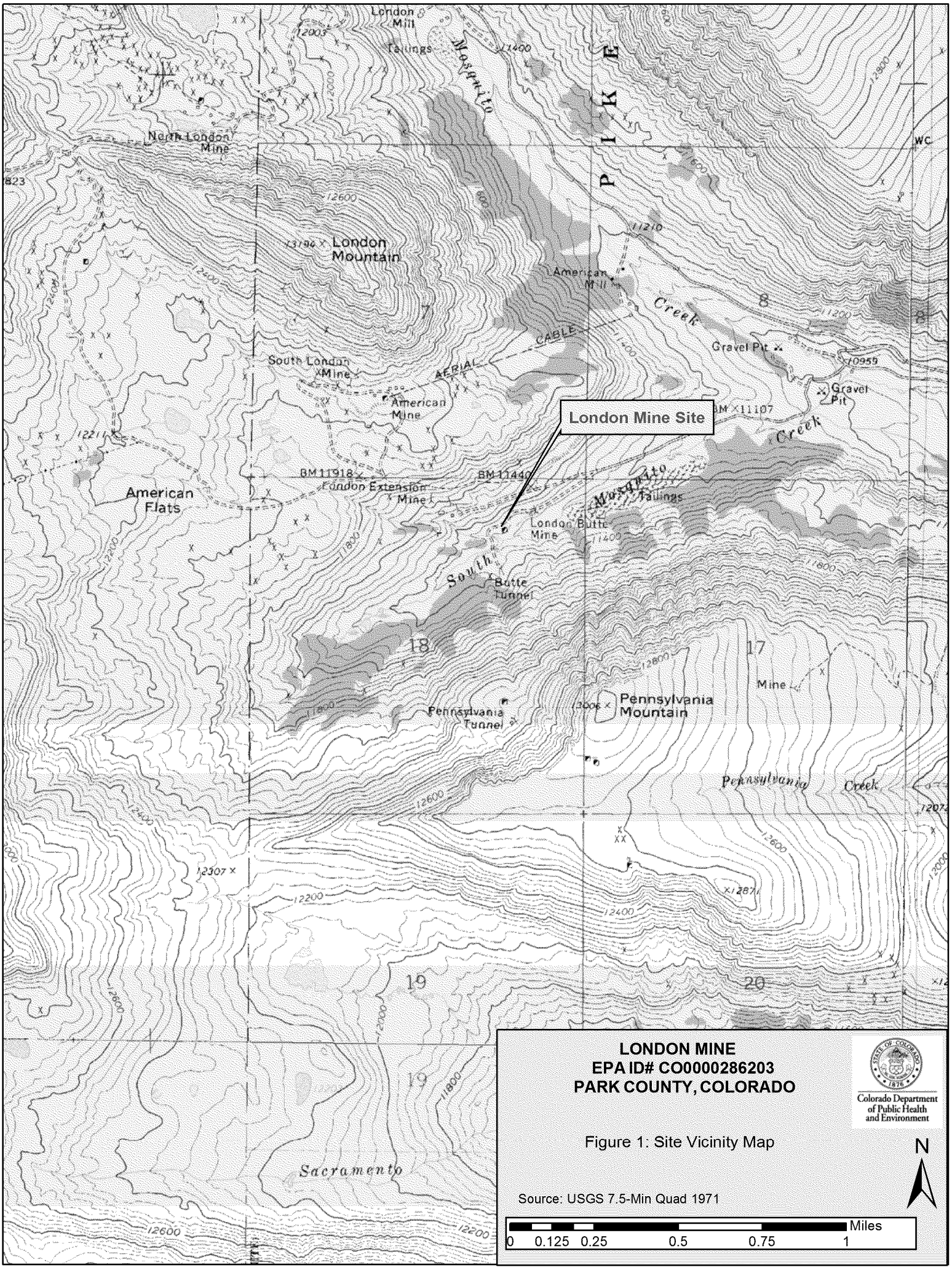
CDPHE (HMWMD), April 24, 1998, *Site Inspection – Analytical Results Report – London Mines/Mosquito Creek Basin (CERCLIS ID CO0000286203)*.

CDPHE (WQCD), various documents, correspondence, and data regarding CDPS Permits, and personnel communication with Ms. Kelly Morgan of the WQCD (see Attachments 2 and 3)

DRMS, London Mill Tailings Reclamation Project Summary Packet and personnel communication with Ms. Erica Crosby of DRMS (see Attachment 4).

ATTACHMENT 1

FIGURES



LONDON MINE
EPA ID# CO0000286203
PARK COUNTY, COLORADO

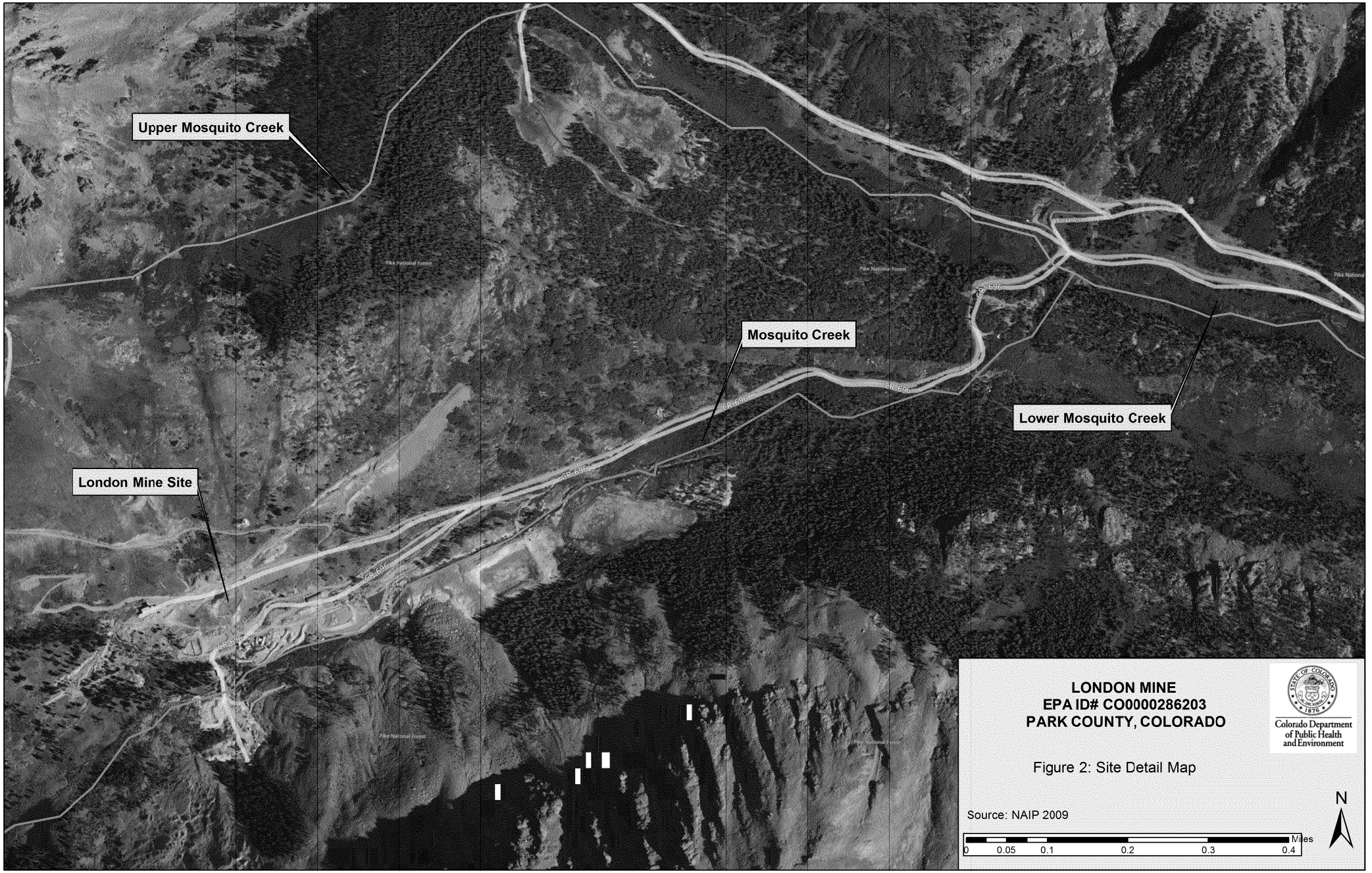
Colorado Department of Public Health and Environment

Figure 1: Site Vicinity Map

N

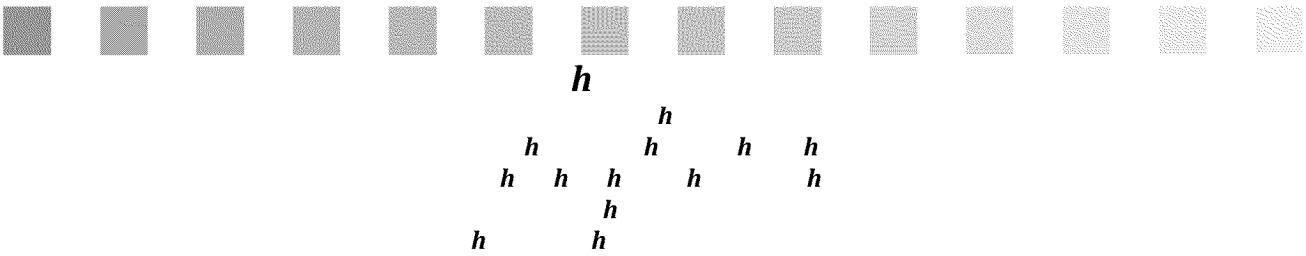
Source: USGS 7.5-Min Quad 1971

Miles
0 0.125 0.25 0.5 0.75 1


Upper Mosquito Creek
Mosquito Creek
Lower Mosquito Creek
London Mine Site
CR-696
CR-696
CR-696
CR-696
CR-696
Pike National Forest
Pike National Forest
Pike National Forest
LONDON MINE
EPA ID# CO0000286203
PARK COUNTY, COLORADO
Colorado Department of Public Health and Environment
Figure 2: Site Detail Map
Source: NAIP 2009
N
0 0.05 0.1 0.2 0.3 0.4
Miles

ATTACHMENT 2

LONDON MINE, LLC LETTER
(OCTOBER 2013)



hfaNgefh

v oNN cN.. N
x Ny N N" N z
N Nx Ny
xy NA z bwg
iheeNx Nx Ny N
y aNx Nnegikfjhe

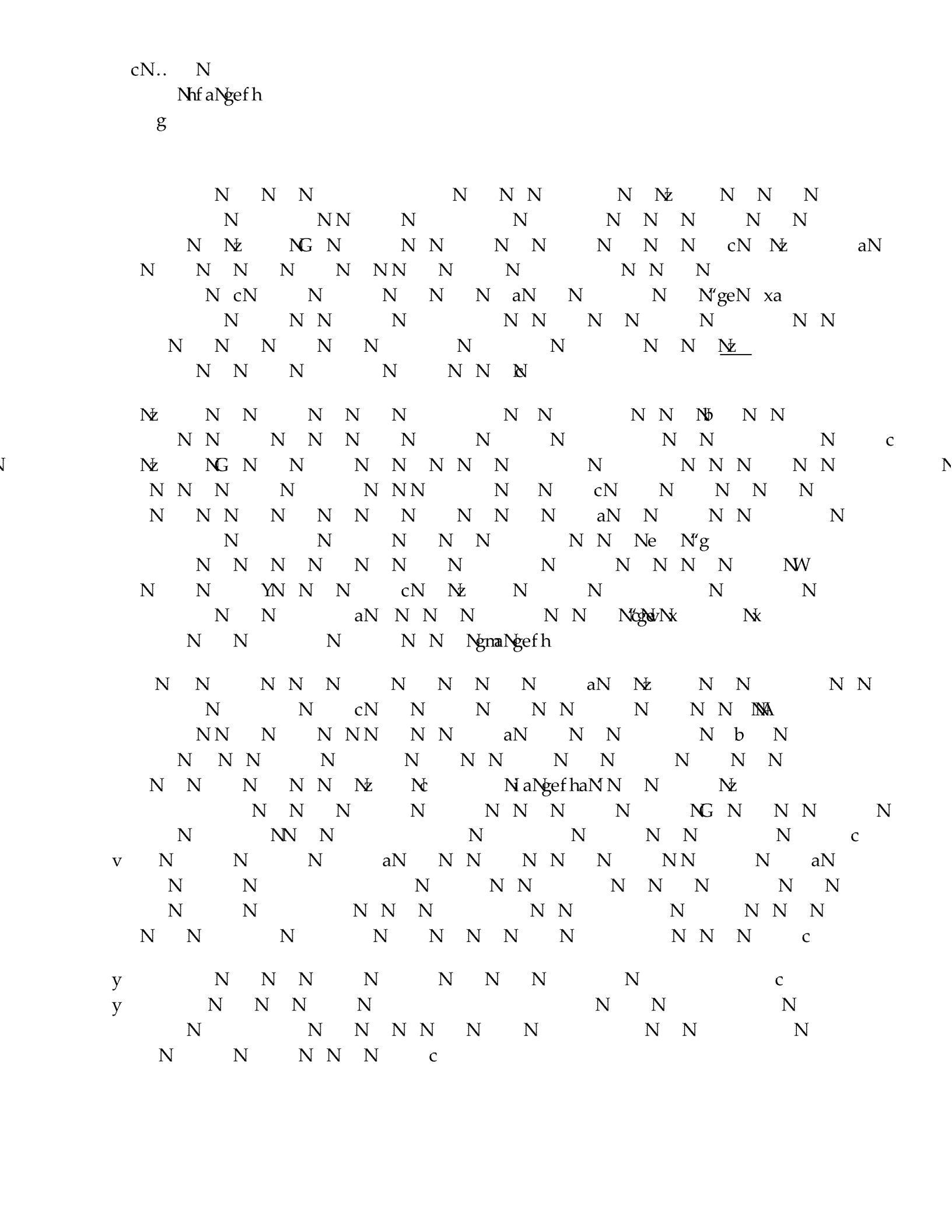
o ' N N N N N a x
N N aN cbXhehgfbf

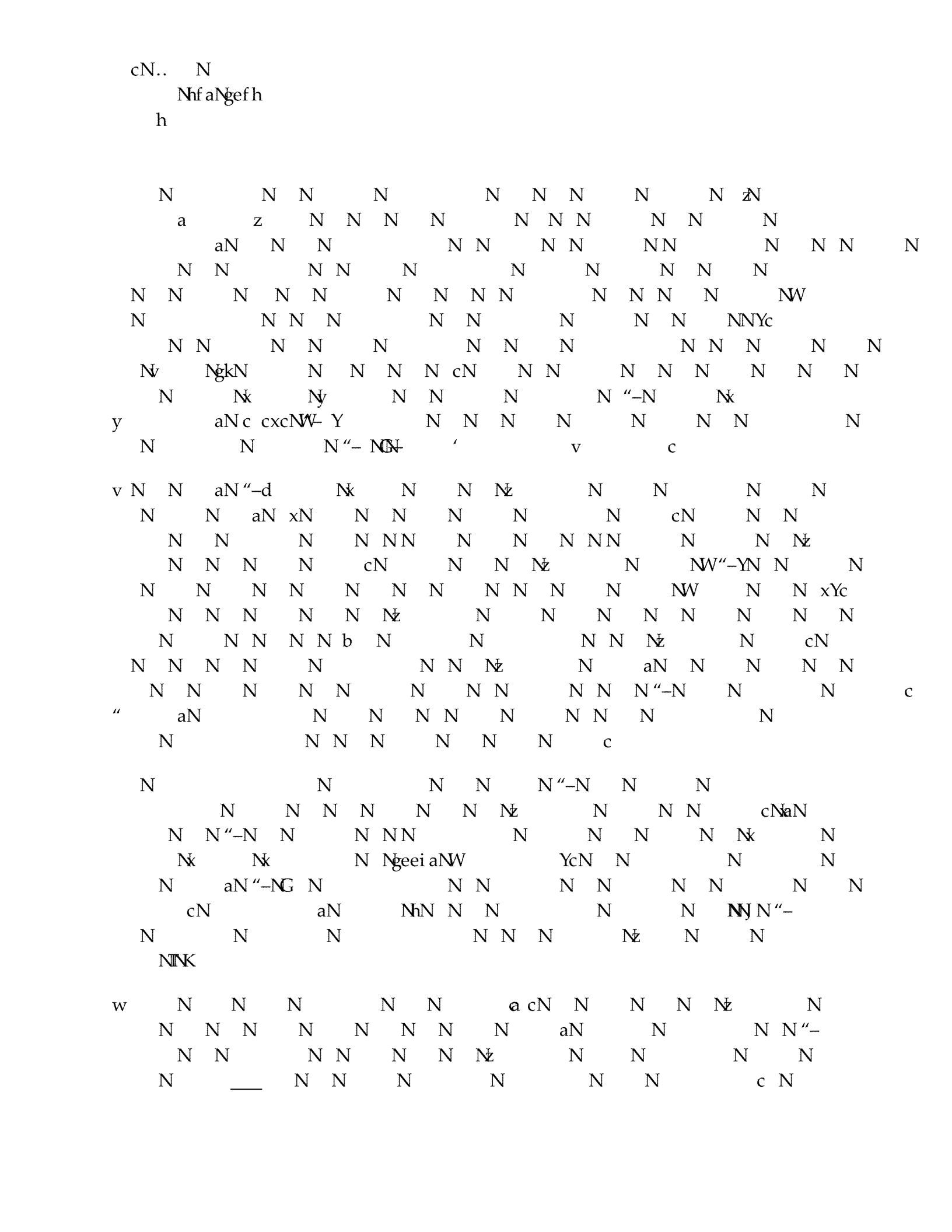
y cN o

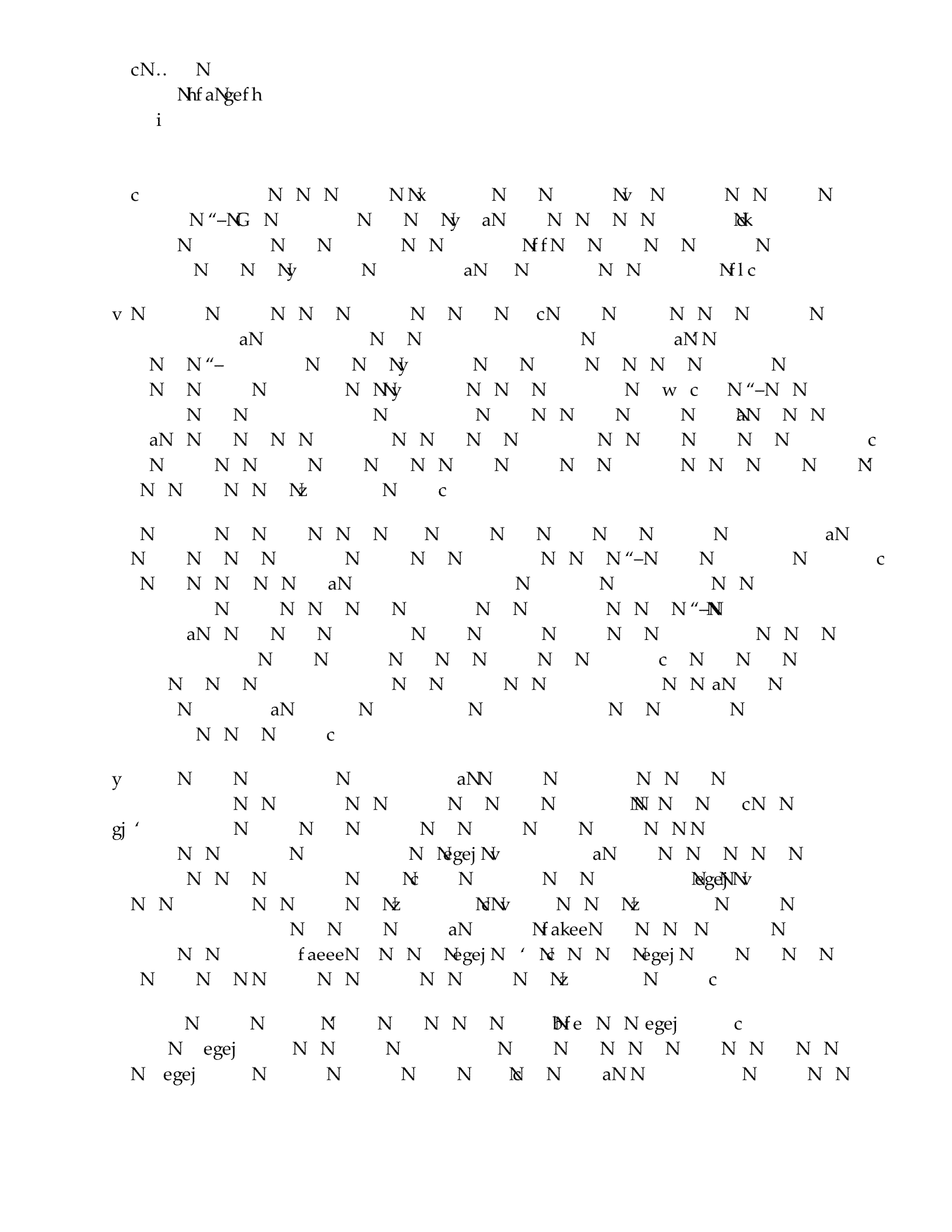
N N NggN N N b N N N NW YaN
N xN N N N N N N N aNgefhc

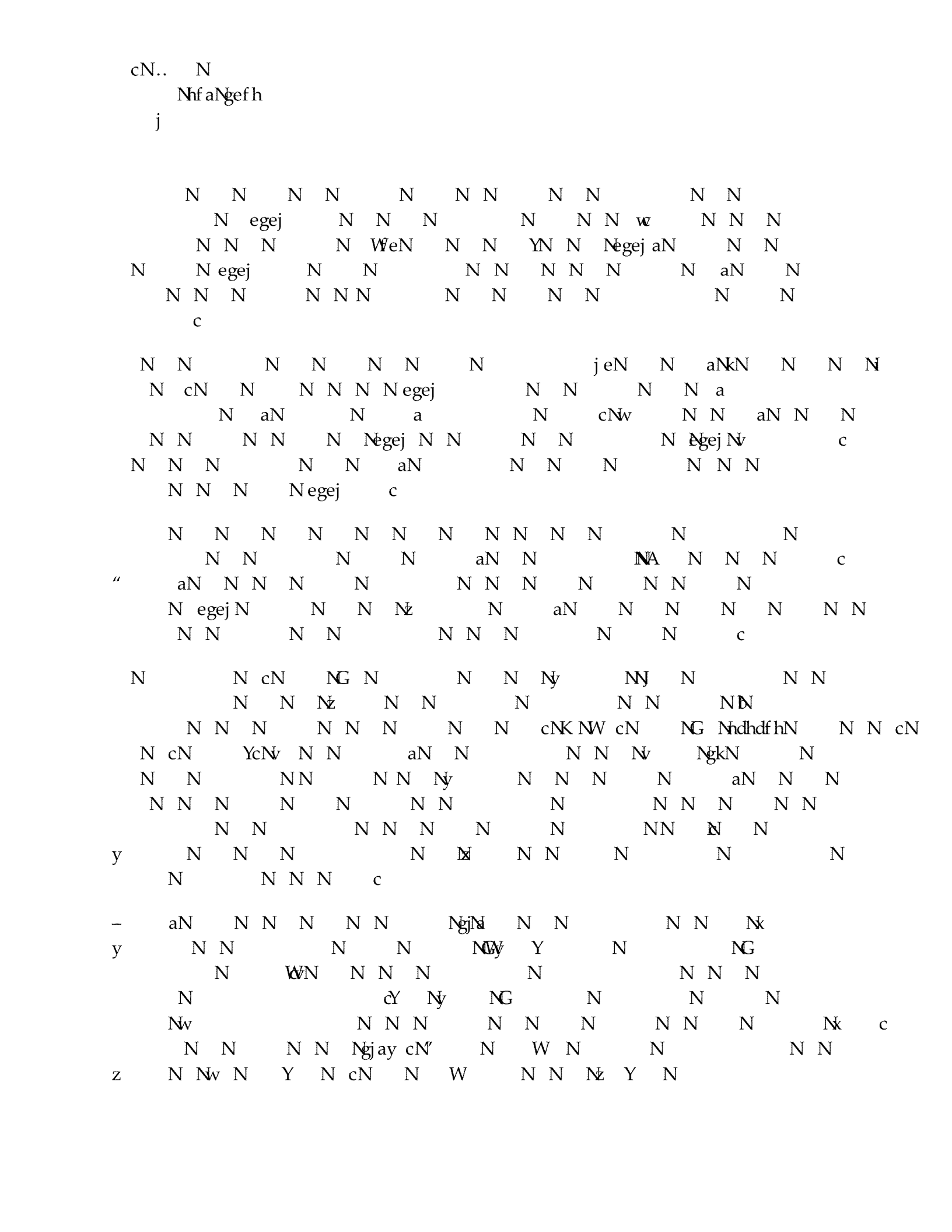
N" NfaNgefhN N aN xN N N N N N N N N
N N z N aN xW N Y N
NfnN N N cNvN N N N cNv N
N N N N NaN N N Ny cN" N
N N N Nz N Nw N a N v NgkaNgefh
N N N N N N N N N N cN N N N N
N N N N N N N
N N N N N N c

v N N N Nv NgkN N N N N N Ny N NG N
N N N NN aN N a N N N
cN N N N N N N N N N
c Nz N N N N N N N N N N
cv N N N N N N N N a









cN.. N
Nhfa Ngefh
k

Ny v N c c N Nz
N Ny N N N N N N N N N
c Nz N Nw N N N N N N N N N
Ny N N N cN N Nz N N N N N N
N Nk y N N‘ N Nz aN
y N c

N N N y N N N N Ngj
N N N cw N N N N N N N
N Nk N N N N N a‘ N N N N N
fmc

a

y N
’ N
N

o y cN” N
” NcN
NcN
v N aN N N Nv N

ATTACHMENT 3

SUMMARY OF RECORDS/FILE REVIEW

RECORDS REVIEW on London Mine (*pertinent files*)

Hazardous Materials and Waste Management Division (HMWMD) Records Center

- *Preliminary Report 1988-1989 South Mosquito Creek Non-point Source Study*
  (Draft copy subject to revision – Updated reports available through Colorado WQCD Standards Unit) – March 3, 1990

  "Introduction: South Mosquito Creek and Mosquito Creek drain watersheds south and north of London Mountain, a region of historic mining activity located approximately 7 miles northwest of Fairplay Colorado. Water quality throughout the area has been adversely impacted by mining activity, however, potential sources of metals and sediment loadings are particularly evident in the upper South Mosquito Creek watershed. Several abandoned mine adits of undetermined ownership and extensive unreclaimed tailings are located in the region of the currently active London Mine. A previous Colorado Department of Health survey documented concentrations of heavy metals in South Mosquito an order of magnitude above chronicly toxic levels for trout (WQCD 1982). Aquatic life studies by NUS Corporation (1980) and the Colorado Division of Wildlife (1987) reported water quality degradation and sedimentation of stream substrates with eroded tailings has rendered South Mosquito Creek virtually devoid of fish and benthic invertebrate populations. Impacts persist downstream for an undetermined distance; however, the Colorado DOW speculates that fish populations in the Middle Fork of the South Platte River below Fairplay, Colorado are chronically affected by metal contamination largely originating in the South Mosquito Creek watershed."

  "Study Objectives: Proceedings of the December 7, 1987 Water Quality Control Commission 207 stream reclassification hearing resulted in South Mosquito Creek being upgraded from Class 2 Cold Water Aquatic Life to Class 1 Cold Water Aquatic Life. Subsequently, during August – September 1988, and May 1989 the Colorado Nonpoint Source Pollution Program conducted a use attainability analysis of the area. The overall purpose of the study was to characterize the current state of the system and to estimate the degree of likely biological recovery given a specified reduction in contaminate loadings. As an outgrowth of the 1988-1989 survey, a reclamation plan for South Mosquito and Mosquito Creek was developed by the Colorado Nonpoint Pollution Project in conjunction with the Colorado Mined Land Reclamation Division. The draft reclamation plan includes elimination of toxic inputs from draining mine adits and stabilization of mine tailings. The initial phase of construction is scheduled for summer 1990 (Clift 1989). In anticipation that reclamation procedures are successful, the biological condition of South Mosquito Creek and Mosquito Creek should move toward a more typical Class 1 Cold Water Aquatic Life condition. Future monitoring is scheduled through 1993 and will determine project effectiveness in restoring chemical and biological integrity within the study area (see South Mosquito Project Implementation Plan for a detailed post-reclamation monitoring schedule)."

  "Results: Metal mining has resulted in the severe degradation of South Mosquito Creek, Mosquito Creek, and to a lesser extent the Middle Fork of the South Platte River. Measures of stream integrity indicate that the degree of disruption is closely related to heavy metal contamination of the water column, as well as siltation of the stream channel from unreclaimed tailings. "

- "*Water Quality Results:* In general, metal concentrations at all reference stations (i.e., 16 sample locations) were below Colorado chronic Table Value Standards (TVS) for aquatic life. The primary exception occurred during snowmelt runoff in May 1989, when elevated concentrations of zinc and lead were recorded at the Mosquito Creek reference station (MC1). Further reconnaissance identified the North London Mill tailings (approximately ¾ mile upstream of MC1) as the probable source. Compared to other metal loadings in the study area, contributions from the North London Mill tailings were relatively minor, and did not appear to adversely affect aquatic life. The most discernable sources of metal loadings in the study area originated from three areas: 1) surface drainage from the London Extension Mine adit (S. Mosquito Creek); 2) surface and possibly subsurface drainage from the Historic London Mine Tailings (S. Mosquito Creek); and 3) the Montgomery Tailings (Mosquito Creek). Metals in transport included ***iron, manganese, lead, cadmium, and zinc***, of which zinc and iron exhibited the largest downstream loadings. The relative contributions of the three areas varied seasonally as is illustrated by zinc transport. During August, the primary source of metal loadings was drainage from the London Extension Mine adit with secondary increases below the Historic London Tailings (located between S3 and S5), and the Montgomery Tailings (located between M3 and M5). In May, during snowmelt runoff, loadings appeared more closely associated with areas of tailings deposition. Increases occurred below the Butte Tailings (NN2 to S3), below the Historic London Tailings (S4 to S5), and downstream of the Montgomery Mill Tailings (M3 to M4). From a toxicity perspective, metals which exceeded Colorado chronic Table Value Standards included dissolved cadmium, iron, lead, and zinc, of which zinc appears to be the primary toxicity variable. The most serious and persistent downstream exceedences occurred during the spring snowmelt period when metal loadings increased due to additional inputs from tailings sources. In May, instream concentrations of dissolved zinc were 2 to 15 times chronic Table Value Standards from a point below the London Extension Mine to MF4, a distance of approximately 13 miles. Also, a grab sample analyzed for total zinc at MF5 suggests exceedences of dissolved standards occur in the Middle Fork of the South Platte River an additional 5.5 miles downstream of Fairplay."

- "*Bioassay Results:* Acute toxicity tests conducted during baseflow (September 1988) and snowmelt (May 1989) conditions confirmed that water quality was potentially limiting to the resident biota of South Mosquito Creek, Mosquito Creek, and the Middle Fork of the South Platte River. Although Ceridoaphnia and fathead minnows (Pimephales promelas) exhibited differential tolerance to metal stress, a relatively tight relationship between zinc concentration and percent mortality of test organisms was observed at all stations. In September 1988, no mortality was observed at reference sites (NN1, SMC1, MC1, MF1), and only slight toxicity was detected in London Mine effluents (Ceriodaphnia spp. 10% mortality). However, exposure to London Extension Mine discharges resulted in 100% mortality to both test organisms. Fathead minnows continued to indicate toxic conditions throughout South Mosquito Creek (60%-90% mortality) but did not reflect toxic effects in Mosquito Creek and the Middle Fork of the South Platte. Ceriodaphnia were more sensitive to zinc toxicity. One hundred percent mortality occurred at all test stations on Mosquito Creek, and at site 2 on the Middle Fork of the South Platte River. In

September 1988, mortality was less than 100% only when total zinc concentrations declined to 70 µg/L at MF4 (80% mortality). The following May, during snowmelt runoff, Ceriodaphnia exhibited the same pattern of toxicity, with the exception that increased zinc transport and concentrations at MF4 and MF5 were reflected by increased mortality at those stations (MF4 100% mortality, MF5 20% mortality). Twenty percent mortality at MF5 indicates periodic metal stress to the resident biota occurs 5.5 miles below Fairplay, Colorado and approximately 18 miles downstream of initial metal loadings. At hardness values of less than 200 mg/L, which were typical of all instream stations, Colorado chronic Table Value Standards for dissolved zinc is 45 µg/L. Significant reductions in Ceriofaphnia mortality from the 100% level occurred when concentrations of total zinc were measured in the range 70-80 µg/L (MF3, MF4, MF5). Reduces mortality of Ceriodaphnia at those sites with predicted borderline toxic conditions is generally supportive of Colorado Chronic standards as applied to natural water systems."

- "*Macroinvertebrates:* Macroinvertebrates reflect both water quality and impacts to the streambed. It is likely that macroinvertebrate response within the study area was a function of both metal toxicity and siltation of the streambed from eroding tailings. EPA level 3 Rapid Bioassessment Protocols (RBP) was applied by partitioning the study area into three sections each with a separate reference station. The upper section included No-name Creek and South Mosquito Creek down to the confluence Mosquito Creek, with all stations compared to the reference station SMC1. Upstream of London Extension Mine inputs, sites SMC2 and NN1 were both classed as "slightly impaired". However, total numbers of organisms collected at SMC2 was substantially less than SMC1 or NN1. Given that taxonomic richness at SMC2 was somewhat less affected, and that some relatively sensitive taxa were present (e.g. Drunella doddsi), suggests that impacts were due primarily to substrate sedimentation from the adjacent Butte Tailings (SMC2 estimated embeddedness 50-75%). Chronic, or periodic metal stress may also be a contributing factor at SMC2. Below London Extension Mine inputs and the Historic London Tailings a combination of metal toxicity and sedimentation resulted in a "severely impaired" macroinvertebrate community extending down to the confluence with Mosquito Creek. RBP analysis suggests a similar condition for Mosquito Creek (MC1-MC5, MC1 reference site). Above the confluence with South Mosquito Creek (MC2), dissolved metal concentrations were below acutely toxic levels for most macroinvertebrates. However, at MC2 the streambed reflected past watershed disturbances through increased sedimentation (embeddedness 50-75%). MC2 was classed as "moderately impaired" with sedimentation suggested as the primary factor. Sources of erosion include partially revegetated tailings within the stream reach as well as the more obvious potential loadings from the Alma American and North London Tailings. Below the confluence with South Mosquito Creek (MC3-MC5) conditions were "severely impaired" reflecting both degraded water quality and some extensive coating of the streambed with fine tailings materials. The decline in RBP score between MC3 and MC4 (from 12 to 0) correlates with a near tripling of dissolved zinc loadings (from 60 µg/L to 150 µg/L) apparently as the result of inputs from the Montgomery Mill Tailings. In general, standing crops of macroinvertebrates in South Mosquito and Mosquito Creeks were reduced to levels considered limiting to a productive fishery. Mean abundance at

impacted sites located on S. Mosquito and Mosquito Creeks were reduced to levels considered limiting to a productive fishery. Adverse impacts to the macrobenthos extends into the Middle Fork of the South Platte River. Below the confluence with Mosquito Creek (MF2), mean abdunance declined from 706 organisms/sq. meter to 203 organisms/sq. meter and taxonomic richness from 31 to 25. Bioassessment ranked the site as "slightly" impaired compared to the reference station MF1. Relatively low zinc concentrations (60-120 µg/L) at MF2, plus the presence of sensitive mayfly taxa (Family Heptageniidae), suggest embeddedness of the substrate (25-50%) as the primary limiting factor. Macroinvertebrate abundance dramatically increased in the Middle Fork of the South Platte river approximately 13 miles downstream of the London Extension Mine (MF3 and MF4, 2149 org./sq/ meter and 1158 org./sq. meter respectively). Although some sensitive taxa were present, increased abundance was driven by large numbers of metal tolerant midges (Chironomidae) and blackflies (Simuliidae). As a result, although total numbers were the highest of any stations in the study area, RBP scores classed the sites as "moderately impaired". Due to the limited data set, and the possibility that increases in midges and blackflies may be driven by factors unrelated to contaminants (e.g. food resources), "impairment" at MF3 and MF4 must be interpreted with caution and in the context of other environmental indicators."

- "*Fish:* Variations in trout abundance and species distribution within the study area reflects the degree of water quality and habitat degradation. Only three brook trout were found in South Mosquito Creek. These were sampled at station 5 approximately 0.9 miles below London Extension Mine effluents where dissolved zinc was measured at 530 µg/L. Fish were not found at either site on "No-name Creek" nor at the upstream reference site on South Mosquito Creek (SMC1). Lack of fish above the London Extension Mine discharge point (site NN1) is due to the high gradient, near water fall nature of the site which precludes suitable holding areas for trout. The absence of fish at the upper reference station of South Mosquito Creek (SMC1) is somewhat of an anomaly. Water quality was not found limiting and three to four foot deep beaver ponds appeared to provide adequate habitat for brook trout. However, it is more than possible that a combination of unusually low winter flows and extreme weather conditions could result in winterkill of fish in the upper watershed. Toxic water quality conditions in South Mosquito Creek at sites SMC3 and SMC4 would then act as an effective barrier preventing recolonization of the upper reaches as represented by SMC1. Trout abundance and species diversity in Mosquito Creek and the Middle Fork of the South Platte River also was reduced, apparently due to mining impacts. Trout abundance in Mosquito Creek was substantially lower downstream of the confluence with South Mosquito Creek (M3, M4, M5) when compared to upstream stations (M1, M2). In addition, although rainbow trout were present in the Middle Fork of the South Platte above and below the confluence with Mosquito Creek, only more tolerant brook and brown trout were found in Mosquito Creek, only more tolerant brook and brown trout were found in Mosquito Creek. Trout abundance and diversity at MF2 below the confluence with Mosquito Creek was not impacted as severely presumable due to dilution of zinc toxicity by uncontaminated waters of the Middle Fork. In summary, given the dissolved metals concentrations in South Mosquito Creek (e.g., zinc 530 µg/L – 580 µg/L), it is probable that lack of fish in this study reach directly reflects

toxic water quality conditions. Depressed populations in Mosquito Creek (zinc 60 µg/L – 180 µg/L) and at MF2 (zinc 60 µg/L) more likely is a combined function of chronic metal stress, reduced macroinvertebrate food base, and siltation of available spawning areas. Although trout abundance increased at MF4 to above MF1 levels, the lack of fish greater than 12 inches at MF4, in conjunction with 80% Ceriodaphnia mortality, suggests possible chronic effects may persist downstream to Fairplay, Colorado. Further investigation is required in this regard."

- "*Recommendations:* Major reductions in metals and suspended sediments loadings are prerequisites to improvement in the biological integrity of South Mosquito, Mosquito Creek, and the Middle Fork of the South Platte River. On the basis of the available data, a 50%-75% reduction in loadings from the London Extension Mine, the Historic London Tailings and the Montgomery Mill Tailings should result in substantial improvement in the beneficial uses of the study area. Expected benefits would be return of healthy brook trout populations to South Mosquito Creek, improvement in the fishery and biological diversity of Mosquito Creek, and reduction in chronic toxicity to the Middle Fork of the South Platte River. Improved water quality alone should result in a fairly rapid increase in the abundance and diversity of aquatic organisms within South Mosquito and Mosquito Creeks, a distance of approximately 7 miles. However, the full natural potential of the system will only be approached as sedimentation of stream substrates is reduced. Cleansing of substrates would be expected to occur primarily during limited periods of intense hydraulic scouring associated with snowmelt runoff. Accurate estimates of the time required for substrates to recover to a more typical condition are difficult. Reasonably, this could be expected to require several years."

- *South Mosquito Creek Nonpoint Source Project – Project Implementation Plan*, submitted by Colorado Mined Land Reclamation Division, Denver, Colorado – May 29, 1990

"*General Site Description:*

The South Mosquito Creek Nonpoint Source Project is located in Park County approximately 7 miles northwest of Fairplay and 13 miles south of Breckenridge. South Mosquito Creek drains an area approximately 4.4 square miles in size on the east side of the Mosquito Range. South Mosquito Creek joins Mosquito Creek about 2.5 miles from its source and ultimately flows into the Middle Fork of the South Platte River north of Fairplay. Previous studies have indicated that aquatic life in South Mosquito Creek is essentially nonexistent and that aquatic life in adjoining Mosquito Creek is severely depleted as a result of the poor water quality and degradation of the habitat due to the extensive historic mining. The impacts of mining continue downstream into the Middle Fork of the South Platte at least as far as Fairplay. Four sources of contamination were identified in the South Mosquito and Mosquito Creek drainage basins during a study of the water quality and aquatic life by the Colorado Department of Health in August 1988. These four sources of contamination include the Montgomery Mill tailings, historic London Mine tailings, Butte tailings, and drainage from the abandoned London Extension Tunnel. Three of these, the Montgomery Mill tailings, the historic London Mine tailings, and drainage from the London Extension Tunnel were investigated further during the summer of 1989 as part of the Nonpoint Source Program. Because the active mining operation at the London Mine has made use of the Butte tailings, that area was

not included in the Nonpoint Source investigation. A fifth area was also identified during a follow-up investigation by the Department of health in May 1989. This area, the North London Mill tailings in Mosquito Creek, was found to be a source of contamination to that creek during the spring runoff. However, because this area was not included in the original scope of this project, the North London Mill tailings were not studied further and will not be considered in this report. Erosion of the historic London Mine tailings along South Mosquito Creek and the Montgomery Mill tailings along Mosquito Creek has caused an increase in sediment in both creeks as well as an increase in the heavy metals content of the water. In addition, acid mine drainage, flowing from the abandoned London Extension Tunnel, has also caused an increase in heavy metals and is of relatively low pH. The contribution of the acid mine drainage and the runoff from the tailings is resulting in severe siltation of the creeks and an inhospitable environment for the aquatic life. The difficulty of designing reclamation plans for the area is increased due to the elevation of the site and the presence of an active mine in the site vicinity."

"*Montgomery Mill Tailings:*

The Montgomery Mill tailings are located in the Mosquito Creek valley about one mile southwest of Park City on the south side of the main access road into Mosquito Gulch. The site is accessed by a small dirt road going south from the main Mosquito Gulch road. The dirt road crosses Mosquito Creek on a wooden bridge. The foundation for the old Montgomery Mill lies at the south edge of the valley. The mill tailings lie in the valley below and north of the old mill site. A breached and barely recognizable berm, which once was used to hold the tailings in the pond, trends about N 20° W across the valley. The tailings extend from the mill foundation on the south side of the valley across the valley to Mosquito Gulch road, covering an area of approximately four acres. A large open stope lies on the south side of the valley just southeast of the mill site. In addition, an open shaft, which has been temporarily closed using sheet metal and metal screens, is located just uphill of the open stope."

Reclamation Info: Not included in report (pages 15 through 25 are missing from document).

"Historic London Mine Tailings:

The historic London Mine tailings are referred to as 'historic' to avoid confusion with any tailings or waste from the active mining operation at the same site also called the London Mine. The historic London Mine tailings were deposited in the 1930's and are located south[east] of London Mountain in the South Mosquito Creek valley about 0.6 miles upstream of its confluence with Mosquito Creek. The tailings lie on the south side of South Mosquito Creek. Access across South Mosquito Creek to the area is possible over a culvert just west of the historic tailings. The entire area of historic London Mine tailings covers approximately 16 acres. However, the active London Mine operation (temporarily shut down as of June 1989) has used approximately 7 acres of that area for an interim storage tailings pond, which was constructed in 1987. The area disturbed by the London Mine operation is at the west end of the historic mine tailings. The area being considered for reclamation by the Nonpoint Source Program includes the eastern part of these tailings downstream of the interim storage tailings pond. This area covers about 9 acres. The historic London Mine tailings are the residue from the milling

operation of the London Gold Mines Company. Although the London Mine had been operating since 1876, onsite milling was not initiated until the fall of 1932. At that time, a 60-ton concentrator was built at the mine site. By 1937, the mill was operating at an increased capacity of 200 tons per day working around the clock. Since 1981, the London Mine Venture has operated a small mine in part of the old London Mine workings. As of June 1989, this operation was temporarily shut down due to declining gold prices. However, their plans are to reopen as soon as economic conditions permit. The long-term mining and processing plans of this operation include the construction of a mill and associated facilities. In anticipation of the mill operation, the London Mine Venture constructed an interim storage tailings pond in 1987. This tailings pond lies on part of the historic London Mine tailings and is not being considered for reclamation by the Nonpoint Source Program. The long-term plans for tailings storage include the construction of a 90-foot high tailings dam in the South Mosquito Creek valley. The proposed location of this dam is at the downstream (east) end of the historic London Mine tailings. Ultimately, this dam and the tailings behind it would encompass all of the historic London Mine tailings."

Reclamation Info: "The area of tailings currently being considered for reclamation is downstream of the interim tailings pond of the current London Mine operation and covers approximately 9 acres. The primary reclamation Objectives for the historic London Mine tailings are to stabilize the unvegetated Tailings. "

Alternatives for Reclamation: "Relocation of the Tailings or In Situ Reclamation of the Tailings. The preferred alternative for stabilizing the unvegetated tailings is in situ reclamation. Because of the large volume of tailings material involved at the historic London Mine tailings site (112,000 cubic yards) and the lack of a suitable storage site in the immediate vicinity, the relocation option is not considered feasible."

"London Extension Tunnel Drainage Treatment System:

The London Mine forms a large northwest trending complex of drifts and tunnels under London Mountain. At the northwest end of the complex is the North London Mine portal. At the southeast end of the complex are the London Mine Venture portal, the Ophir Tunnel and the London Extension Tunnel. The London Mine Venture portal is the access for the currently operating London Mine Venture. Several adits also intersect the middle of the complex from American Flats. These include the American Shaft, the South London Tunnel and the Havighorst Tunnel. The London Extension Tunnel portal, which is currently draining acidic and metal-laden water to the surface water system, is at an elevation of approximately 11,500 feet on the north side of the South Mosquito Creek valley. This portal lies about 175 feet above and 1,200 feet west of the active London Mine Venture portal. The London gold vein was discovered in 1873 and mining began at the North London portal in 1875. The primary ore body is located along the London Fault, which is a reverse fault trending approximately N 30° W and dipping from 60° northeast to vertical. The major production has come from contact zones between Tertiary intrusive and the Pennsylvanian Weber Formation and Mississippian Leadville Limestone. In the 1970's, there were several attempts to mine in the lowest tunnel of

the complex, the currently active London Mine Tunnel or 'Water Tunnel', which daylights on the north side of the South Mosquito Creek valley. The current operation, the London Mine Venture, has been mining the 'Water Tunnel' since 1981. Although the company shut down operations temporarily in June 1989 due to declining gold prices, they intend to reopen as soon as possible. The future mining plans of this company include construction of a mill onsite and mining through London Mountain at the 11,025 level along the London Fault to the North London area."

Reclamation Info: "The major obstacles for reclamation of the mine drainage from the London Extension Tunnel are the extreme climatic conditions existing at the elevation of the portal (11,500 feet) and the active mining being performed at a lower elevation than the exit point of the drainage.The primary reclamation objective for the drainage from the abandoned London Extension Tunnel is to decrease or remove the harmful effect it is having on the surface water system. This could either be accomplished by preventing the drainage from entering the surface water system or by treating the drainage to remove the toxic constituents."

Alternatives for Reclamation: "Infiltration Barriers, Installation of a Water-tight Bulkhead Seal, Air Seals, Passive Mine Drainage Treatment, or Active Mine Drainage Treatment. The preferred alternative for treatment of the acid mine Drainage flowing from the London Extension Tunnel is biosorption through Immobilized biomass."

- *Mosquito Creek – North London Mill Tailings – Project Implementation Proposal*, submitted by Colorado Water Quality Control Division in cooperation with the Colorado Mined Land Reclamation Division, April 24, 1991

  "Currently, the Colorado Nonpoint Source Program, in conjunction with the Colorado Mined Land Reclamation Division, anticipates implementation of a remedial project on South Mosquito Creek during the summer – fall of 1991. Project objectives are to reduce contaminant loadings to Mosquito Creek by 50-75%. This proposal provides baseline data which more precisely identifies loadings sources and aquatic life uses in the upper reaches of Mosquito Creek, and within the context of reducing contaminant loadings in the watershed as a whole, presents alternatives for future remedial action. At this time, selection and implementation of a restoration alternative on Mosquito Creek is envisioned by the end of 1992."

- *North London Mill Tailings Nonpoint Source Project – Project Implementation Plan*, submitted by Colorado Mined Land Reclamation Division, Denver, Colorado, July 1992

  Alternatives for control of nonpoint source problems: Full Restoration, Treatment In-place, or Partial Restoration. "Partial restoration of the tailings is the preferred alternative for reclamation at this site."

- *London Extension Project – Project Implementation Plan*, submitted by Colorado Division of Minerals and Geology, Denver, Colorado, April 1993

  "Passive Mine Drainage Treatment is the BMP selected for this proposal."

  (Note included: "Was not implemented per Greg Parson due to regulatory/permit liabilities" – note dated 7/7/1996)

- *Preliminary Assessment – London Mines/Mosquito Creek Basin – Park County, Colorado*, prepared by the Colorado Department of Public Health and Environment, July 22, 1995

  "The site (CERCLIS No. CO 0000286203) was identified as warranting study by the U.S. Environmental Protection Agency (EPA) Region VIII office in Denver, Colorado. Acid mine drainage from the London Extension Mine, mine rock dump seepage and mill tailing erosions laden with heavy metals and sediments from the Butte Tunnel mine and the historic London Mine mill tailings, the Montgomery-Alma/Betts and North London Mine mill tailings have been identified by CDPHE Water Quality Control Division (WQCD) to have adversely affected water quality and aquatic life habitat in the South Mosquito Creek and Mosquito Creek proper. This adverse impact extends, in a lesser degree, to the Middle Fork South Platte River from its confluence with Mosquito Creek to beyond Fairplay, Colorado, covering 13 miles of total impacted stream."

  "The title to the surface and mineral rights of the mining claims at the London Mines is held by Mr. Ben L. Wright. Title to most of the water rights for discharge from the London Butte Mine water tunnel is held by the Coors Brewing Company. The London Butte Mine was operated as recently as 1981-91 by the London Mine Venture but is now under Temporary Cessation as approved by the [Mined Land Reclamation Division] (MLRD) in June, 1992."

  "Historical mining activities in the site areas produced considerable volume of mine rocks and mill tailings which have been deposited in the South Mosquito Creek valley and Mosquito Gulch. The largest of the mill tailings piles in the historic London Mine mill tailings on the bottom of the South Mosquito Creek valley. This 16-acre, 112,000 cubic yards pile is the accumulated residues from the on-site milling operation of the London Gold Mine Company at the London Butte Mine that started in the 1930's. The operation apparently utilized the flotation method exclusively for concentrating gold for smelting. Generally, the flotation method involved agitating the pulverized ore materials (milled ore) with water, oil and chemical reagents in a concentrator which caused the precious metal elements to float to the surface for collection."

  "South Mosquito Creek and Mosquito Creek are classified by WQCD as Class I Recreation, Class I Cold Water Aquatic Life, Water Supply and Agriculture. Both creeks exceed the metal standards for cadmium, copper, iron, lead, manganese and zinc that are in effect for this designated classification. WQCD, in its 1988-89 South Mosquito Creek Non-Point Source Study (WQCD, 1990), has identified the drainage from London Extension Mine, seepages and runoffs from the Butte Tunnel mine rock dumps and the historic London Mine mill tailings in the South Mosquito Creek area, and the Montgomery-Alma/Betts and North London Mine mill tailings in the Mosquito Gulch as sources of heavy metal and silt contaminations in the South Mosquito Creek and Mosquito Creek basins. As a consequence, MLRD undertook the South Mosquito Creek Non-point Source Project (MLRD, 1990) which made specific recommendations for reclamation

of the contaminated areas as identified above. Gregory Parsons, WQCD Non-Point Source Program, indicated that in-situ reclamation work were completed on the historic London Mine, Montgomery-Alma/Betts and North London Mine mill tailings in 1991-92 under Section 319 of the Clean Water Act. Reclamation efforts consisted primarily of regarding, mulching and revegetation and rehabilitation of runoff channels on and around the tailings pile. Analytical data or official documentation on the success of these reclamation projects are not available at the present time."

"Confirmed and potential sources of contamination that impact the entire Mosquito Creek Basin are grouped into three areas [as follows]:

1. South Mosquito Creek Area Sources
   - *London Butte Mine Water Discharge* – Water discharges directly into a water tunnel connected to a pipe to a sedimentation pond adjacent to the South Mosquito Creek. Discharge flow rates range from 1.27 to 1.84 cubic feet per second (cfs) or 572 to 828 gallons per minute (gpm). Indications are that pH of the discharge water from the pond ranges from 7 to 8 but has elevated [total] iron and [dissolved] zinc [that exceeds standards].
   - *London Extension Mine Water Discharge* – Water is gravitationally conveyed in a pipe that directly discharges into the No Name Creek. Water discharge flow rates range from 0.089 to 0.12 cfs or 40 to 54 gpm. The pH of the water discharge ranges from 4 to 6 and has high contents of aluminum, cadmium, copper, iron, manganese and zinc.
   - *London Mine Historic Mill Tailings* – This is the largest mill tailing accumulation pile in the study area covering 16 acres with an estimated volume of 112,000 cubic yards (cy). It is directly on the floodplain of South Mosquito Creek with portions of it being traversed by the creek channel. In-situ reclamation work were completed on this source pile in 1991-92 under Section 319 of the Clean Water Act.
   - *London Extension Mine Rock Dump* – This is easily the largest mine rock dump at the site with an estimated volume of 200,000 cy (110,000 cy on USFS lands). The dump has common metal sulfide mineralization and there are scattered red iron staining on the pile.
   - *South London/American Mines Rock Dumps* – Indicated size of the disturbed area by rock dump piles is 10 acres. Analysis of water sample taken at the No Name Creek below these dumps showed no adverse heavy metals impact.
   - *Butte Tunnel Mine Rock Dump* – The mine rock dumps on the bank of South Mosquito Creek on both sides of the Butte Tunnel at the southwest foot of Pennsylvania Mountain were identified as sources of heavy metal contaminants. The estimated total area of the dumps is about 4 acres.
2. Upper Mosquito Creek Area Sources
   - *Champaign Mine Drainage and Rock Dump* – Water drainage from the Champaign Mine is indicated to be 100 gpm. Aggregate volume of the rock dumps at the mine is estimated to be around 3600 cy. Samples of mineralized material from dumps indicated 0.410 ounces per ton (opt) gold, 42.18 opt silver, 3% lead and 7.5% zinc.
   - *North London Mine Rock Dump* – The mine dumps at the oldest gold mine on London Mountain are estimated to have a total volume of 44,000 cy. The dumps are rich in metal sulfide minerals showing high levels of copper, iron, lead and zinc; yellow-red staining can be seen on the dump piles.

- *North London Mine Mill Tailings* – This tailings of 4 acres and volume of 20,000 cy is on the Upper Mosquito Gulch. Runoffs from tailings pile drain directly into the Upper Mosquito Creek. In-situ reclamation work were completed on the pile in 1991-92 under Section 319 of the Clean Water Act.
- *American Mill Tailings* – The American Mill tailings pile is on the Mosquito Gulch and adjacent to Upper Mosquito Creek channel. Area or volume estimate on the tailings pile is not available from data that were examined.
- *Unnamed Mine Adits Water Discharge* – Two unnamed mines just above the South Mosquito Creek/Mosquito Creek confluence junction are discharging directly on Mosquito Creek. Flow rates from the mine adits are indicated to be ¼ to ½ gpm.

3. Lower Mosquito Creek Area Sources
   - *Montgomery-Alma/Betts Mill Tailings* – This mill tailings pile is on the Lower Mosquito Gulch on the floodplain of the Lower Mosquito Creek. It has an area of about 3 acres. In-situ reclamation work were completed on the source in 1991-92 under Section 319 of the Clean Water Act.
   - *Orphan Boy Mine Rock Dump* – The rock dump at the Orphan Boy Mine is indicated to be three acres. Indications are that these dumps are rich in zinc and iron oxides.
   - *Unnamed Mines Rock Dumps* – Unnamed mines rock dump tailings southwest of the Orphan Boy Mine is indicated to have impacted a 2-acre area.
   - *Hock Hocking Mine Rock Dumps* – Rock dumps of undetermined area or volume exist at the Hock Hocking Mine. It is indicated that the Hock Hocking Mine was primarily a silver-lead-zinc mine; typical vein sample from the mine indicated: 9.24 opt silver, 12.0% lead and 5.77% zinc."

"Heavy metal loading and mill tailing siltation have rendered the South Mosquito Creek virtually devoid of fish and benthic invertebrate population…..Potentially, the area of contaminated soils in the South Mosquito Creek valley, alone, could cover 50 acres, at a minimum. These result from the repeated exposures of the valley floor to the heavy metals-laden mine drainages and the seepages and runoffs from the mine rock dumps and mill tailings deposits on the bottom and sides of the valley."

"Metals laden drainage flows from inactive or abandoned mines, seepages and runoffs from the mine rock dumps and mill tailings in the South Mosquito, Upper Mosquito and Lower Mosquito drainage basins constitute the main potential threats to human health or the environment in the entire Mosquito Creek Basin and in the Middle Fork South Platte River from its confluence with Mosquito Creek down to as far as 6 miles beyond Fairplay. In its attempt to characterize water quality in the South Mosquito Creek, WQCD, in 1988-89, collected surface water chemical data in the entire Mosquito Creek Basin. WQCD found that heavy metal contamination from the London Mines have resulted in the degradation of water quality and aquatic life habitat in these surface waters to the degree that South Mosquito Creek has become virtually devoid of fish and benthic invertebrates. Mosquito Creek has been found able to support trout populations but a depressed condition and only limited to the hardier brown and brook trouts."

- *Site Inspection – Sampling and Analysis Plan – London Mines/Mosquito Creek Basin – Alma Mining Area – Park County, Colorado*, prepared by the Colorado Department of Public Health and Environment, May 21, 1996

  "This SAP calls for the collection of 68 field samples (including eight background samples) consisting of: twelve (12) source samples, two (2) soil samples, six (6) ground water samples, twenty four (24) aqueous and twenty four (4) sediment surface water samples. In addition, the sampling team will provide quality assurance/quality control samples consisting of duplicate samples, rinsate blanks, field blanks, a trip blank and triple-volume water samples for laboratory calibration purposes."

- *Site Inspection – Sampling Activities Report – London Mines/Mosquito Creek Basin (CERCLIS ID CO0000286203) – Park County, Colorado*, prepared by the Colorado Department of Public Health and Environment, June 1996

  "A total of 76 samples were collected into 183 sample containers. The samples collected included; 11 solid source and soil background samples, including one opportunity sample; 4 aqueous source samples from mine drainages; 6 groundwater samples; 33 aqueous surface water samples – includes 6 quality assurance samples and 1 opportunity sample; and 22 sediment surface water samples, including one opportunity sample. 43 aqueous samples were submitted for inorganic analysis [total and dissolved metals], including 5 for cyanide analysis; 7 aqueous samples were submitted for organic analysis [volatile organic analysis, base-neutral-acid (BNAs) or extractables, and pesticides/PCB]; and 6 aqueous samples were submitted for radiological analysis. All non-aqueous samples will be analyzed for Total Metals and one (1) for cyanide analysis. Three sediment samples were collected for organic analysis [volatile organic analysis and pesticides/PCB/extractables]. Four sediment samples were collected for radiological analysis, and five sediment samples were collected for TOC analysis."

- *Site Inspection – Analytical Results Report – London Mines/Mosquito Creek Basin (CERCLIS ID# CO0000286203) – Park County, Colorado*, prepared by the Colorado Department of Public Health and Environment, April 24, 1998

  Surface Water Analytical Results by Stream Segment:

  - Upper Mosquito Creek (main stream samples and tributary samples):
    "Although elevated concentrations of arsenic, barium, calcium, copper, lead, magnesium, potassium and zinc were present in the tributary samples, only magnesium, potassium and zinc exhibited elevated metals concentrations downstream in the surface water samples taken from the main stream Upper Mosquito Creek wetland and fishery areas. Analytical results from the surface water samples in the main stream Upper Mosquito Creek generally exhibit lower analyte concentrations than those found in the South Mosquito and Lower Mosquito creeks. Sediment samples do show widespread elevated analyte concentrations."

  - South Mosquito Creek (main stream samples, tributary samples, and source samples):
    "Metals concentrations from aqueous samples at South Mosquito Creek are generally higher than those found in Upper Mosquito Creek. The most downstream aqueous sample taken from the main South Mosquito Creek shows the highest metals concentration for copper (6.70 µg/L), lead (45.20 µg/L) and manganese (40.00 µg/L). High dissolved and total metals concentrations were found in the London Extension Mine drainage sample for barium,

cadmium, calcium, copper, iron, magnesium, manganese, nickel, sodium and zinc. In addition, high zinc dissolved and total metals concentrations that exceed AWQC standards are found in aqueous source samples, a tributary sample, and main stream samples. Sediment samples from the South Mosquito Creek exhibit generally lower analyte concentrations than in the Upper Mosquito Creek except for cadmium and zinc. The most significant indication of zinc loading in the entire Mosquito Creek Basin is associated with the London Extension Mine drainage with computed loading of 30.29 and 30.06 ppd respectively for dissolved and total zinc at the flow rate of 0.22 cfs. This load continues downstream in the No Name Creek and down the main stream South Mosquito Creek, and ultimately to the rest of the Lower Mosquito Creek wetlands and fishery."

- Lower Mosquito Creek (main stream samples and tributary samples):
  "Though at lower concentrations, the same analytes found with elevated concentrations in the South Mosquito Creek are reflected in the main stream Lower Mosquito Creek."

- Middle Fork South Platte River (main stream samples):
  "None of the release aqueous samples from the Middle Fork South Platte River exhibits high dissolved metal concentration except for copper which is elevated in the Middle Fork South Platte River wetland and fishery below the Sacramento Creek. Although below AWQC standards, zinc total metals concentrations are also elevated starting in the wetlands below the Pennsylvania Creek and down below the Sacramento Creek. For total metals in the sediment samples, elevated concentrations are indicated for arsenic, silver, and sodium."

Ground Water Pathway:
"Although below health-based benchmarks such as the Reference Dose and Cancer Risk Screening Concentration and the maximum contaminant levels (MCL's) for drinking water, some dissolved and total metals concentrations in the samples collected from domestic and household spring and ground water wells in the Lower Mosquito Creek area (Park City) are elevated when compared to background. Elevated zinc concentrations, both dissolved and total, are present in four wells. Elevated manganese concentrations are shown in three wells. Four of the sampled wells in the area are claimed to be drinking water wells and can serve about ten people. "

Water Quality Control Division (WQCD) Records Center

- *Renewal Colorado Discharge Permit System (CDPS), Stormwater Discharge Associated with Construction Activities Application, Permit COR030000, Cert# COR03A548*, dated May 5, 2007

Permitted Project/Facility Information:

Project/Facility Name: Leach Well & London Extension Mine Water Treatment Upgrades
Address: London Mine, Unincorporated Park County, Colorado
Total Acres of Project Site: 17 acres
Area of Disturbance: 2.5 acres
Nature of Construction Activity: Construction of the Leach Well pipeline and outfall structure, installation of overhead power lines, enlargement of existing London Extension tunnel treatment ponds and sludge disposal site.
Immediate Receiving Water: No Name Creek

Ultimate Receiving Water: South Mosquito Creek

- *Colorado Discharge Permit System (CDPS), PrairieCenter Metropolitan District No. 1, London Mine Extension Tunnel, CDPS Permit Number: CO-0045209, Park County*, July 19, 2005

Issued December 21, 2005 / Effective February 1, 2006 / Expiration Date January 31, 2011
Type of Permit: New, Industrial Minor
Facility Type: Category 3, Subcategory – Hardrock Mining: Mine Dewatering from 50,000 up to 999,999 gallons per day or over
Facility Location: The London Mine Extension Tunnel (Extension Tunnel) is located approximately 12 miles northwest of Fairplay, Colorado
Discharge Point: Outfall 001 is the discharge to No Name Creek from a lined sedimentation pond that receives treated Extension Tunnel water (MON1 is at the same location as Outfall 001).
Type of Industry: "This permit is for the Extension Tunnel which is part of an underground gold mining operation which has ceased operation. The principal ores at this mine included gold and a small amount of silver; previously, the production rate was approximately 500 tons of ore per day (design capacity) and 200 to 300 ounces of gold per day (maximum production rate). No mining or exploration activity has occurred on the property since 1943 and the last operator, London Mine Venture, terminated its lease with the property owner (London Mine, LLC) in September 1992."
Contributing Wastewater Sources: "The contributing wastewater sources at this facility include mine water and groundwater from the Extension Tunnel."
Chemicals Used: "Cement kiln dust (CKD) is used to raise the pH and precipitate metals."
Wastewater Treatment Facility (WWTF) Description: "The mine wastewater treatment process, consists of a collection system inside the mine adit, followed by CKD addition equipment, and a lines settling pond. The system includes a partial bulkhead seal with a relief valve at the bottom and a collection pipe two feet above the floor of the mine. The relief valve is to flush sediments that accumulate behind the partial bulkhead into the settling pond outside of the adit. This will reduce the amount of sludge that passes through the CKD addition portion and should increase the life of the facility. The relief valve will likely have to be opened every three to four months, based upon the observed flows. The collected water flows through a 6-inch pipe, out of the mine, into a flash tank (conical tank) located below the CKD bin. CKD is added to the water by a rotary valve at this location. The CKD/water mixture then flows through a static mixer into a steeply pitching, serpentine, corrugated plastic line, approximately 800 feet long, into the settling pond. The amount of CKD added is controlled by a pH probe and control unit located below the static mixer. The entire system is powered by 480-volt lines, which were installed for the treatment system. Overflow from the settling pond discharges (Outfall 001) to No Name Creek, while the CKD and metals settle out in the pond. Settled CKD is planned to be periodically removed (about twice a year) from the pond by a slide gate and pipeline, which convey the settled CKD to a drying basin. Once dried, the CKD is transported to an on-site disposal area for final disposal. The operations of the settling pond and the sludge-drying pond maintain a minimum 12-inch layer of settled CKD. Typically, CKD has greater than 90% of its particles less than No. 200 sieve and, thus, would be classified as silt or clay under the Unified Soil Classification system. The Division agrees that using CKD sludge as a liner (i.e., an undisturbed minimum CKD layer of 12-inches) should minimize seepage of the pond contents (treated mine

drainage) to ground water, in accord with the requirements for minimal seepage as stated in Section 61.14(9) (Regulation No. 61). On this basis, a permit for possible discharge to ground water is not needed for the ponds."

Stipulation (2004): "The two point sources (Extention Tunnel WWTF and Water Tunnel) discharging to the impaired waters of No Name Creek and South Mosquito Creek (Segment COSPUS02c) are the sole point sources of the two pollutants (zinc and cadmium) contributing to the water-quality impairment. The owners of the point sources (London Mine LLC), the owner of some of rights to the water from the Water Tunnel (THF Prairie Center Development, LLC), and the Division entered into a Stipulation that establishes zinc limits for each point source, includes improvements to and continuous operation of the treatment facility for one point source (Extension Tunnel) that contributes over 90% of the total zinc released to the receiving waters from both point sources, and that the discharge permit for the Extension Tunnel will be assigned to the above water rights holder, or their assignee. The latter is a critical condition of the Stipulation and the planned attainment of water quality standards in Segment COSPUS02b on March 1, 2007, since the existing treatment facility at the Extension Tunnel will be upgraded and continuously operated as a requirement of the initial discharge permit and renewals."

- *Notice of Violation / Cease and Desist Order (Number: IO-090715-1) – In the Matter Of: London Mine, LLC, CDPS Permit Number: CO-0038334, Park County, Colorado*, CDPHE – Division of Administration – Water Quality Control Division, July 15, 2009

Summary of *Pertinent* Findings of Fact and Conclusions of Law:

1. "London Mine, LLC owns and/or operates the London Mine Water Tunnel and associated treatment works (the "Facility"), which is located approximately twelve (12) miles northwest of Fairplay, Park County, Colorado."
2. "The Facility consists of a treatment works for an underground mining operation that is no longer in operation. The principle products from this mine included gold and a small amount of silver. The contributing wastewater sources at the Facility include mine water and groundwater conveyed through the London Mine Water Tunnel. The facility treats mine related wastewater from the tunnel portal through a sedimentation pond."
3. "The Permit [effective on February 1, 2006 and is due to expire January 31, 2011] authorizes London Mine, LLC to discharge treated wastewater from the Facility through the outfall associated with the final sedimentation pond (Outfall 001A) and into South Mosquito Creek. The final sedimentation pond receives water directly from the tunnel portal."
4. "Pursuant to Part I.A.1 of the Permit, among other parameters, London Mine, LLC's permitted discharge shall not exceed the effluent limitations specified [within the Permit]."

Notice of Violation:

"…The Division has determined that the London Mine, LLC has violated the following sections of the Permit:

Part I.A.1 of CDPS permit number CO-0038334, which states in part: "In accordance with the Water Quality Control Commission Regulations for Effluent Limitations, Sections 62.4, and the Colorado Discharge Permit System Regulations, Section 61.8 (2), 5 C.C.R. 1002-61, the permitted discharge shall not contain effluent parameter concentrations which exceed the following limitations, discharge more than the mass pollutant loadings specified below, or exceed the specified flow limitation."

- *Stormwater Annual Report – Metal Mining (& Coal)*, Colorado Department of Public Health & Environment – Water Quality Control Division, Received January 25, 2011

  Permittee (Company Name): London Mine, LLC
  Facility Name: London Mine
  Permit Certification No.: COR-040134
  Reporting Period: January 1 – December 31, 2010
  Report on the Facility's Overall Compliance with the SWMP:

  > "A new Stormwater Management Plan was developed for the property in 2010 and a comprehensive stormwater inspection was performed on site on November 6, 2010. Site improvements included reconfiguring the water discharge conveyance system from the London Mine Extension tunnel discharge and general site maintenance. Problems noted was erosion of tailings and some staining from a dozer stored on site. These issues are currently being addressed."

  Summary of Each Comprehensive Stormwater Facility Inspection Made:

  > *First Inspection (November 6, 2010)* – "Items noted during the inspection included: 1) potential erosion of tailing; and 2) storage of leaking equipment (dozer) near office buildings."
  >
  > *Second Inspection* – "NA – because this is an inactive mine site, only one inspection is required per year."

- *Letter to Water Quality Control Division from London Mine, LLC*, regarding DMR-QA 31 Proficiency Testing Study – CDPS Permit No. CO-0038334 – London Mine, LLC, dated August 17, 2011

  "London Mine, LLC participated in the DMR-QA 31 Proficiency Testing study as required per a letter from the Environmental Protection Agency (EPA) dated December 21, 2010. London Mine, LLC uses two laboratories to perform water quality testing associated with its CDPS permit, which are: 1) Environmental Sciences Corp, located in Mt. Juliet, Tennessee; and 2) Energy Laboratories, located in Casper, WY. All results for the parameters included in the London Mine CDPS Permit No. CO-0038334 were within acceptable ranges."

- *Stormwater Annual Report – Metal Mining (& Coal)*, Colorado Department of Public Health & Environment – Water Quality Control Division, Received February 6, 2012

  Permittee (Company Name): London Mine, LLC
  Facility Name: London Mine
  Permit Certification No.: COR-040134
  Reporting Period: January 1 – December 31, 2011
  Report on the Facility's Overall Compliance with the SWMP:

  > "During the compliance period of January 1 through December 31, 2011, the London Mine site was largely idle with the exception of ongoing maintenance activities and operation of the Extension Tunnel water treatment plant. Several of the issues/concerns identified in 2010 were remedied in 2011 (e.g., the dozers' hydraulic fluid leak was repaired, and a large amount of the old equipment stored at the London Butte was loaded onto semi trailers and lowboys and hauled off of the premises, precluding the potential for fluid leakage). In general BMPs seem to be working well

with the possible exception of some exposed, historic London Butte tailings along S. Mosquito Creek, where some bank erosion was possible."

Summary of Each Comprehensive Stormwater Facility Inspection Made:

First Inspection (June 15, 2011) – "The dozer stored on site that was leaking small amounts of hydraulic fluid was repaired and moved. In addition, old mining equipment at the London Butte "boneyard" was in the process of being moved to Albuquerque, alleviating the potential for additional fluid leakage at the site. The London Butte tailings at S. Mosquito Creek was inspected and no additional erosion was noted – all other conditions at the mine remained unchanged. "

Second Inspection (August 19, 2011) – "This second inspection was performed about one month later after a large scale landslide event on the south slope of Pennsylvania Mtn, which occurred on August 7, 2011. This event occurred after several days of heavy rainfall. Debris could be heard shifting for a long period afterward (weeks), but no further large mass wasting occurred. This is a historic slide area based on geomorphologic inspection of pre slide aerial photos, reactivated by heavy rain. The northern, toe of the slide crossed the western portion of the London Butte tailings and covered S. Mosquito Creek, which was at least temporarily dammed up. This initial shock wave disturbed some of the historic tailings material, pushing it into S. Mosquito Creek on that day only. The creek appears to have been displaced to the north up against a small ridge which stopped the debris flow. While some of the London Butte tailings are still exposed at the bank of the creek, much of the surface area of the London Butte tailings has been covered up by ten feet. While some of the tailings are still exposed at the bank of the creek…..much of the surface area of the London Butte tailings have been covered up by ten or more feel of landslide material. No other changes were noted during this inspection, other than that more of the old equipment was moved off of the site from the London Butte Mine yard area. The landslide did NOT effect any mine workings, treatment ponds or other water conveyance/storage vehicles other than S. Mosquito Ck.. Both the CDPHE and the Colorado geological Survey were notified within a few days of the writer becoming aware of the landslide event."

Other Inspections (August 29, 2011) – "This inspection was to check on the landslide stability. While a few rocks/debris could still be heard in the basin above shifting, no additional, major movements had taken place, and the weather was much drier. This situation where the slide contacted the London Butte tailings remained the same, as did all other concerns. Additional equipment had been hauled off from the London Butte mine area. "

Other Inspections (October 2, 2011) – "This inspection was added to look at the landslide again. No additional movement was noted, however, the treatment pond for the Ext. Level discharge was now empty. A small, additional amount of old equipment had also been moved off of the property since the August inspections."

- *Stormwater Annual Report – Metal Mining (& Coal)*, Colorado Department of Public Health & Environment – Water Quality Control Division, Received February 14, 2013

Permittee (Company Name): London Mine, LLC
Facility Name: London Mine
Permit Certification No.: COR-040134
Reporting Period: January 1 – December 31, 2012
Report on the Facility's Overall Compliance with the SWMP:

"Since the end of 2011, the London has undertaken efforts to coordinate the clean-up and removal of materials and equipment located on the surface of the London Mine. Specifically, removed from the London Butte mineyard in 2012 was a large amount of mining related equipment and materials. Removal of these items succeeded in eliminating the potential for the release of hydraulic fluids contained in the equipment. Additionally, the London has succeeded in removing some 20 barrels of buried mill reagents that were disposed of at the Eerie landfill. No mill reagents remain at the London. The SWMP is working and no major storm events (such as the landslide that occurred on the Butte in August 2011) have taken place. The landslide debris lobe from the August 2011 event appears to now be stable. The London is cooperating with the Division of Reclamation Mining and Safety (DRMS) to implement the DRMS's proposed Inactive Mine Reclamation Program at the London. The DRMS proposed Reclamation Program will include removal of tailings located at the London Butte Tailings/Landslide Area and at the Lower Tailings Area (near Elephant trap)."

Summary of Each Comprehensive Stormwater Facility Inspection Made:

First Inspection (May 11, 2012) – "First inspection of the year, considerable snow still present, no change from last late fall, 2011 inspection, no problems noted, all berms same as last fall, 2011 inspection. No leaks of any kind noted below old machinery/equipment near shop and in the London Butte area."

Second Inspection (August 19, 2012) – "Second inspection of 2012 – no discernable degradation of berms, roads, etc., a large amount of mining equipment had been removed over the course of the summer (since 1st inspection) from the London Butte Mineyard. The lower lobe of the landslide of 2011 now appears stable and stabilized by the tangled web of trees and grass that overlie the top of the slide where it flowed over S. Mosquito Ck. In 2011 – no discernible change."

Other Inspections (November 8, 2012) – "Last visit with Margaret Staub, of Envirogroup, to assure the overall SWMP guidelines were being met (hired by LMLLC to perform that inspection with Dean Misantoni, Manager of the London Mine). All of the 20 odd barrels of mill reagents that were partially submerged in London Butte tailings had been removed to the Eerie landfill as of this date. The remaining barrels on the London Butte mineyard were found to contain only dolomite frill cuttings from earlier exploration and are not an immediate concern."

- *Correspondence Letter from Golder Construction Services to the Permits and Enforcement Section of the Water Quality Control Division – Colorado Department of Public Health and Environment*, regarding Discharge Monitoring Report – January 2013 – London Mine Extension Tunnel – CDPS CO 0045209, letter dated February 13, 2013

"There was no discharge from the Extension Tunnel Sedimentation Pond during the month of January. Due to circumstances beyond the ORC's control, no flow has been measured through the Sedimentation Pond flume since August 13, 2011. No flows were noted from the discharge monitoring point during two trips to the London Mine in the month of January. The Extension Tunnel Sedimentation Pond has not filled and is not discharging to No Name Creek since the completion of the 2011 sludge removal project. With the available volume and no consistent measured flows through the Water Treatment Plant, there will likely be no discharge from monitoring location 001A/X well into the month of February 2013. Until then, plant and discharge flows will be monitored and the Water Quality Control Division will be notified when discharge flows resume at discharge monitoring location 001A/X."

- *Correspondence Letter from the Water Quality Control Division / Water Pollution Control Compliance & Enforcement Unit to Vranesh and Raisch, LLP*, dated March 12, 2012

  "On January 23, 2012, representatives of the Water Quality Control Division (the "Division") and the Estate of Ben Wright [former London Mine Manager] on behalf of London Mine, LLC (the "Estate") held a meeting to discuss the current status of the wastewater discharge from the London Mine Water Tunnel and associated treatment works (the "Facility") and its CDPS Permit Number CO-0038334 (the "Permit"). Since 2006, the Facility has consistently exceeded certain effluent limitation outlined in the Permit. As a result of the exceedances the Division issued Notice of Violation/Cease and Desist Order, Number IO-090715-1 to London Mine, LLC on July 15, 2009, with the expectation that London Mine, LLC engage in efforts to ensure compliance with the Permit by no later than March 31, 2010. However, the Facility has failed to consistently produce effluent in compliance with the Permit. The Division considers this non-compliance a serious matter in need of a resolution."

  "During the January 23, 2012 meeting, representatives of the Estate discussed several options for treating or mitigating the discharge from the London Mine Water Tunnel including: constructing a new water treatment plant to handle and treat the wastewater from both the London Mine Water Tunnel and the London Mine Extension Tunnel, rehabilitating the London Mine Extension tunnel in order to gain safe access to the inside of the mine, and/or putting a bulkhead in the London Mine Water Tunnel to control the flow of water from that source. However, during the meeting representatives of the Estate indicated that the Estate lacks the funds to make any of these improvements to the Facility. Therefore, the Division requests that the Estate provide a written statement and documentation [no later than April 16, 2012] supporting the claim that the Estate cannot fund improvements to the Facility to ensure compliance with the terms and conditions of the Permit. …Along with this documentation, please submit a detailed written plan and expedited time schedule for the implementation of measures that the Estate will immediately undertake to reduce or mitigate the concentrations of pollutants in the discharge associated with the Facility.

- *Correspondence Letter from the London Mine Estate to the Water Quality Control Division regarding the above letter*, dated March 30, 2012

  "The Estate of Ben Wright ("Estate") is in receipt of your March 12, 2012 letter…concerning the water discharge from the London Mine Water Tunnel, which is owned by the London Mine, LLC and the request for certain financial and other documents of the Estate. We previously requested to meet with you [Ms. Kelly Morgan – WQCD], and did, on January 23, 2012. At that meeting, we reviewed the history regarding the water discharge from the London Mine – including the fact that the London Mine, LLC and THF Prairie Center Development, L.L.C. ("THF") are parties to a Stipulation entered into before the Colorado Water Quality Control Commission in 2004 (the "Stipulation"). The Stipulation addresses among other things, the operation and maintenance of the Extension Tunnel Treatment Plant (the "Facility"). "

  "Section 1.4 of the Stipulation provides that the purpose of the Facility is "to treat water discharged from the Extension Tunnel." The Stipulation further provides that "THF shall provide for continued operation and maintenance of the Extension Tunnel Treatment Plant [Facility] to treat water discharged from the London Mine via the Extension Tunnel." Sec. 3.2 Moreover, under the Prairie Center Metropolitan District No. 1 Permit No. CO-0045209, THF's duty extends

to the "collection system inside the mine adit," i.e., the Extension Tunnel. It is THF that has the obligation and duty to maintain and operate the Extension Tunnel and the Facility. And as discussed below, it is due to THF's damage to the Extension Tunnel, and its subsequent failure to address that damage, that the water discharge issues at the London Mine have resulted. The Stipulation further provides that the London Mine, LLC shall have responsibility for the London Mine Water Tunnel, but there is no requirement to treat the water that flows from the Water Tunnel. The Stipulation also requires that the London Mine, LLC submit to the State monthly discharge flow and quality reports ("Discharge Monitoring Reports") for the Mine Water Tunnel (Section 2.1.3 of the Stipulation). During several monitoring periods, the Discharge Reports submitted by the London Mine, LLC have indicated periodic effluent limitation exceedances at the Mine Water Tunnel. "

"As we discussed with you at our January 23, 2012 meeting, the London Mine, LLC has been actively looking into what the potential cause of these effluent limitation exceedances may be, including exploring technical resources for assessing the situation. From investigations conducted to date, which include guidance received from technical consultants, the London Mine, LLC understands that the water that should be discharged from the Extension Tunnel to the Facility for treatment is unfortunately being diverted to the Mine Water Tunnel. The Estate and the London Mine, LLC have been advised that the diversion of the Extension Tunnel water to the Mine Water Tunnel is a result of damage to the Extension Tunnel caused in connection with THF's past operations at the London Mine. Because the Extension Tunnel water is not discharging to the Facility and therefore has not been treated, with it comingles with the Mine Water Tunnel water it results in the Water Tunnel effluent limitations exceedances. As was explained in the London Mine, LLC's August 14, 2009 Answer to the Notice of Violation, we believe this unauthorized discharge and/or unauthorized bypass of the Extension Tunnel water into the Mine Water Tunnel is a violation of the Prairie Center Metropolitan District No. 1 Permit."

"The Estate remains very concerned about this matter and wants to work cooperatively with the State to find the right solution to address the effluent limitation exceedances at the Mine Water Tunnel. The Estate believes that a future meeting with the State, THF, London Mine LLC and the Estate would be appropriate to address the water issues at the London Mine."

- *Correspondence Letter from the London Mine Estate to the Water Quality Control Division regarding Prairie Center Metropolitan District No. 9 – London Mine Extension Tunnel – CDPS Permit Number: CO-0045209 – Park County, Colorado – Compliance Order on Consent, Number IC-12051401 (the "**Compliance Order**")* , dated June 18, 2012

"The Estate of Ben Wright ("Estate") submits the following comments to the Water Quality Control Division's ("WQCD") Compliance Order with Prairie Center Metropolitan District No. 9 ("Prairie"). The Estate holds the assets of the London Mine. The Estate's comments are submitted in accordance with the WQCD's Public Notice No. CO-05-2012 dated May 18, 2012. As detailed in this letter, the Estate is concerned that the operations of Prairie in and around the London Mine Extension Tunnel are resulting in exceedances under CDPS Permit No. CO-0038334 for the London Mine Water Tunnel (the "London Permit"). Until the impact of Prairie's activities upon the recorded exceedances under the London Permit is known, the Estate requests that the Compliance Order not be entered into with Prairie."

Background: "The London Mine, LLC and THF Prairie Center Development, L.L.C. ("THF/Prairie") are parties to a Stipulation entered into before the Colorado Water Quality Control Commission in 2004, (the "Stipulation"). The Stipulation addresses among other things, the operation and maintenance of the Extension Tunnel Treatment Plant (the "Facility"). Section 1.4 of the Stipulation provides that the purpose of the Facility is "to treat water discharged from the Extension Tunnel." The Stipulation further provides that "THF shall provide for continued operation and maintenance of the Extension Tunnel Treatment Plant [Facility] to treat water discharged from the London Mine via the Extension Tunnel." Sec. 3.2 Moreover, under Prairie's Permit No. CO-0045209, THF/Prairie's duty extends to the "collection system inside the mine adit," i.e., the Extension Tunnel. It is THF that has the obligation and duty to maintain and operate the Extension Tunnel and the Facility."

"For more than a year, exceedances under the London Permit have been measured. These exceedances have been troubling to the Estate for many reasons, not least of which is the fact that the water known to be discharged under the London Permit through the Water Tunnel was clean, not requiring treatment under the Stipulation before it is discharged. The Stipulation only required treatment of the water discharged from the Extension Tunnel under the Prairie permit."

"The London Mine, LLC has been actively looking into what the potential cause of these effluent limitation exceedances may be, including exploring technical resources for assessing the situation. From investigations conducted to date, which include guidance received from technical consultants, the London Mine, LLC understands that the water that should be discharged from the Extension Tunnel to the Facility for treatment is unfortunately being diverted to the London Mine Water Tunnel. The Estate and the London Mine, LLC have been advised that the diversion of the Extension Tunnel water to the Mine Water Tunnel is a result of damage to the Extension Tunnel caused in connection with THF's past operations at the London Mine. Because the Extension Tunnel water is not discharging to the Facility and therefore has not been treated, when it comingles with the Mine Water Tunnel water it results in the Water Tunnel effluent limitations exceedances. As was explained in the London Mine, LLC's August 14, 2009 Answer to the Notice of Violation, we believe this unauthorized discharge and/or unauthorized bypass of the Extension Tunnel water into the Mine Water Tunnel is a violation of the Prairie Center Metropolitan District No. 1 Permit."

Prairie/THF's Duty to Fix Any Damage It May Have Caused To The Water Tunnel: "The Compliance Order finds that Prairie "is neither the owner nor the operator of the London Mine or the Extension Tunnel itself and has no ownership or leaseholder interests in the mineral rights or mineral interests associated with the London Mine." Compliance Order ¶5. While it is correct that Prairie has no ownership interests of the minerals associated with the London Mine, Prairie does in fact have duties and responsibilities related to the maintenance and repair of the Extension Tunnel pursuant to the October 20, 2003 Permanent Easement Deed and Agreement entered into by Prairie, the Wright Trust, Ben L. Wright Jr. and the London Mine LLC ("Easement Agreement"). A copy of the Easement Agreement is included with these comments:

Pursuant to the Easement Agreement,

> "[i]f in constructing, repairing, replacing, operating, maintaining and/or using the road and bridge over the London Mine Extension Tunnel **THF causes any damage to the Tunnel, it shall promptly restore, replace, or repair the Tunnel to its original condition as may be reasonably practicable**." Section 2.1.6

"The responsibility of Prairie/THF to address damage it has caused to the Extension Tunnel is clearly set forth in the Easement Agreement. The London Mine believes that it is damage to the Extension Tunnel by THF that has resulted in the exceedances under the London Permit. Only with restoration and repair of the damage caused to the Extension Tunnel will the exceedances under the London Permit be resolved."

"Because, as the Estate and the London believe, the exceedances under the London Permit are the direct result of the damage caused to the Extension Tunnel by Prairie/THF, the Estate asks the WQCD not enter the Compliance Order until a resolution with Prairie/THF on this issue can be reached. Addressing the violations committed by Prairie that are set forth in the Compliance Order concurrently with the issue of its actions that have resulted in the exceedances under the London Permit, will result in a holistic solution to this matter. The reality is that one entity, Prairie/THF, is ultimately responsible for the exceedances that have been reported under the Prairie Permit and the London Permit. Therefore, addressing a solution to these exceedances in one Compliance Order is the preferable solution to this problem."

- *Personal discussion with Ms. Kelly Morgan (of CDPHE-WQCD, Clean Water Compliance & Enforcement Unit) on March 21, 2013*

Ms. Morgan provided an up-to-date status report on the London Mine/London Mine Water Tunnel/London Mine Extension Tunnel ongoing issues. Ms. Morgan stated that there has not been any effluent coming from the Extension Tunnel in over a year, and that the Estate and London Mine LLC are still in discussions with Prairie/THF regarding the Extension Tunnel damages resulting in water quality exceedances from the Water Tunnel effluent. Ms. Morgan stated that as of today (March 21, 2013), the CDPHE-WQCD issued a Notice of Violation/Cease and Desist Order to London Mine LLC in regard to CDPS Permit Number: CO-0038334 (London Mine Water Tunnel) (*see bullet below*).

- *Notice of Violation/Cease and Desist Order (NOV/CDO), Number: IO-130321-1 sent to London Mine Limited Liability Company (London Mine LLC) (CDPS Permit Number: CO-0038334) from the Water Quality Control Division – Clean Water Compliance & Enforcement Unit*, dated March 21, 2013

Notable Findings of Fact and Conclusions of Law listed in NOV/CDO:

  - "The London Mine Water Tunnel is part of the mine workings of the London Mine which is an underground gold mine which has ceased operation. Historically, the principle ores at this mine included gold and a small amount of silver. The contributing wastewater sources at the Facility include acid mine drainage from the London Mine Water Tunnel portal to a sedimentation pond for passive treatment that consists solely of settling. No other wastewater treatment occurs at the Facility."
  - "The Facility is the subject of the Colorado Discharge Permit System, Permit No. CO-0038334 (the "Permit"). The current Permit became effective on February 1, 2006… The Permit expired on January 31, 2011 and has subsequently been administratively extended, pending permit reissuance."
  - "The Permit authorizes London Mine, LLC to discharge treated wastewater from the Facility through the outfall associated with the sedimentation pond (Outfall 001)

and into South Mosquito Creek. The Permit includes an authorization for a discharge from Outfall MON1, which is a database distinction assigned to Outfall 001 for monitor and report only effluent parameters required to support a reasonable potential analysis."

- "On July 15, 2009, the Division issued a Notice of Violation/Cease and Desist Order, Number IO-090715-1, to London Mine, LLC (the "2009 Order"). The 2009 Order cited London Mine, LLC for violations of the Permit. The 2009 Order included a number of corrective actions that London Mine, LLC was required to implement at the Facility in order to ensure permit compliance."
- "London Mine, LLC's discharge monitoring reports ("DMRs") [from May 2009 to January 2013] include, among other information and data, effluent concentration summary data for total suspended solids, pH, potentially dissolved zinc, and potentially dissolved cadmium which exceeded the effluent limitations imposed by Part I.A.1 of the Permit."

Effluent Self-Monitoring Data:

Total Suspended Solids: Max 7 Day Average Limit = 20 mg/L (***Result = <50***)
30 Day Average Limit = 20 mg/L (***Result = <50***)

pH: Minimum Limit = 6.5 S.U. (***Result = 6.23 and 6.4***)

Zinc (potentially dissolved): Max 7 Day Average Limit = 1,300 µg/L (***Result = 1,400 to 4,910***)
85th Percentile of 24 Month Rolling Average Limit = 654 µg/L
(***Result = 1377.5 to 2,967***)

Cadmium (potentially dissolved): 30 Day Average Limit = 3.2 µg/L (***Result = 3.8 to 14.9***)

Notice of Violation: "Based on the foregoing Findings of Fact and Conclusions of Law, you are hereby notified that the Division has determined that the London Mine, LLC has violated the following section of the Permit:

> **Part I.A.1 of Permit No. CO-0038334** which states in part: "In accordance with the Water Quality Control Commission Regulations for Effluent Limitations, Section 62.4, and the Colorado Discharge Permit System Regulations, Section 61.8(2), the permitted discharge shall not contain effluent parameter concentrations which exceed the following limitations…"

- *Surface Water Monitoring Data from South Mosquito Creek conducted by Golder Associates Inc. (provided by Ms. Kelly Morgan of WQCD)*

Date Sampled	*Analyte (Dissolved Metal)*	*Result (µg/L)*	*State Standard (µg/L)*
10/18/2012	Cadmium	3.0	0.74
	Zinc	820	280
11/14/2012	Cadmium	2.3	0.72
	Zinc	600	280
12/14/2012	Cadmium	3.1	0.74
	Zinc	730	280

01/09/2013	Cadmium	2.5	0.77
	Zinc	870	280
02/12/2013	Cadmium	2.3	0.77
	Zinc	740	280

- *Enforcement & Compliance History Online (ECHO) (EPA Database) – Detailed Facility Report under Clean Water Data*

  - London Water Tunnel CDPS Permit No.: CO-0038334
    Permit Expiration Date: January 31, 2011
    Receiving Water: South Mosquito Creek
    Compliance Order: Issued on July 15, 2009 to London Mine, LLC

  - London Mine Extension Tunnel CDPS Permit No.: CO-0045209
    Permit Expiration Date: January 31, 2011
    Receiving Water: No Name Creek
    Compliance Order: Issued on September 9, 2009 to Prairie Center Metro District No. 9 for "failure to comply with permit effluent limitations and failure to submit complete DMRs."
    CDPS Permit Closed: May 14, 2012
    Compliance Order on Consent (COC): Issued on May 14, 2012 for "violations cited in NOVCD dated September 9, 2009. COC effective July 11, 2012."
    Civil Penalty Order: Issued on July 11, 2012 for "violations cited in Compliance Order

Division of Reclamation and Mining Safety (DRMS) Records Center

- *Correspondence and London Mill Tailings Reclamation Summary Sheet from Erica Crosby (DRMS Project Manager),* March 19, 2013

  Project Site Description: "The historic London Mine is located in the headwaters of South Mosquito Creek, approximately four miles west of the Town of Alma in Park County. Mining and milling operations have been intermittently active at the London Mine since 1875. The site contains three mill tailings piles and a number of waste rock piles that are immediately adjacent to South Mosquito Creek. The tailings continually leach acidic, metal-laden water into the perennial stream. In the spring, the creek significantly erodes the tailings piles and contributes metal-laden sediment to the creek. South Mosquito Creek fails to meet applicable standards for zinc, iron, manganese and cadmium, and is listed as impaired under section 303(d) of the Clean Water Act. In the early 1980s, Mined Land Reclamation Permit M-1980-250 was issued for modern mining and milling operations at the London. In 1997, at the request of the London Mine Limited Liability Company, the Colorado Mined Land Reclamation Board revoked the permit and forfeited the $12,000 reclamation bond. The bond funds were used to partially stabilize portions of the tailings, but were grossly insufficient to complete reclamation of the overall site to applicable performance standards."

Project Site Characterization: "In June 2011 and May of 2012, high flow water samples, including springs and seeps emanating from the tailings, were collected. Students from the Environmental Learning for Kids program participated and assisted in the May 2012 event. In September of 2011, low flow water sampling was completed. Also, the tailings piles were assessed using x-ray fluorescence and solids samples were collected for laboratory analysis in order to assist in bracketing the pollutant sources. In October 2012, the tailings piles were drilled and surveyed to quantify volumes and characterize geotechnical conditions. A monitoring well was drilled and completed into bedrock just north of the tailings. Asbestos screening of London site buildings was completed. DRMS staff historians and contractors will complete a cultural resource survey when the London site becomes accessible following snowmelt in 2013."

Engineering and Design/Impementation: "The London tailings reclamation can most efficiently be completed over two construction seasons, in 2013 and 2014. Site investigations indicate that tailings fill the natural bed of South Mosquito Creek, and that the creek has been relocated to route along the north edge of the tailings. The preferred reclamation alternative for the London tailings 2013 project area includes removal of tailings adjacent to the relocated creek down to creek level and consolidation into the impoundment constructed in the 1980s (known as the "Elephant Trap"). The consolidated tailings will then be banked against the north flank of Pennsylvania Mountain to maximize separation of the tailings from the relocated creek. Structural fill imported to the project area from permitted gravel sources at or near Alma or Fairplay will be placed over tailings as capping material and to maintain the relocated creek in its current configuration, and plant growth medium will be applied over the cap. A mix of wetland, riparian, and upland vegetation zones will be established in the excavated area and over the consolidated and capped tailings. An existing stream crossing on the northeast corner of the Elephant Trap will be modified to accommodate equipment entering the project area. Currently a 48-inch corrugated steel pipe, 12 feet long passes South Mosquito Creek under the crossing. The crossing will be modified in order to allow equipment to safely enter the site. The crossing will be returned to its pre-existing condition upon completion of the project."

Project Partnerships: "Funding for the London Mine project is by a water pollution control revolving fund grant through Water Quality Control Division, severance tax allocated by the Colorado legislature to revisit and complete reclamation of under bonded permit revocation mine sites, and private donations from Freeport-McMoRan Copper & Gold, Inc."

ATTACHMENT 4

DRMS PROJECT SUMMARY

London Mill Tailings Reclamation: Park County

Project Site Description

The historic London Mine is located in the headwaters of South Mosquito Creek, approximately four miles west of the Town of Alma in Park County. Mining and milling operations have been intermittently active at the London Mine since 1875. The site contains three mill tailings piles and a number of waste rock piles that are immediately adjacent to South Mosquito Creek. The tailings continually leach acidic, metal-laden water into the perennial stream. In the spring, the creek significantly erodes the tailings piles and contributes metal-laden sediment to the creek. South Mosquito Creek fails to meet applicable standards for zinc, iron, manganese and cadmium, and is listed as impaired under section 303(d) of the Clean Water Act. In the early 1980s, Mined Land Reclamation Permit M-1980-250 was issued for modern mining and milling operations at the London. In 1997, at the request of the London Mine Limited Liability Company, the Colorado Mined Land Reclamation Board revoked the permit and forfeited the $12,000 reclamation bond. The bond funds were used to partially stabilize portions of the tailings, but were grossly insufficient to complete reclamation of the overall site to applicable performance standards.

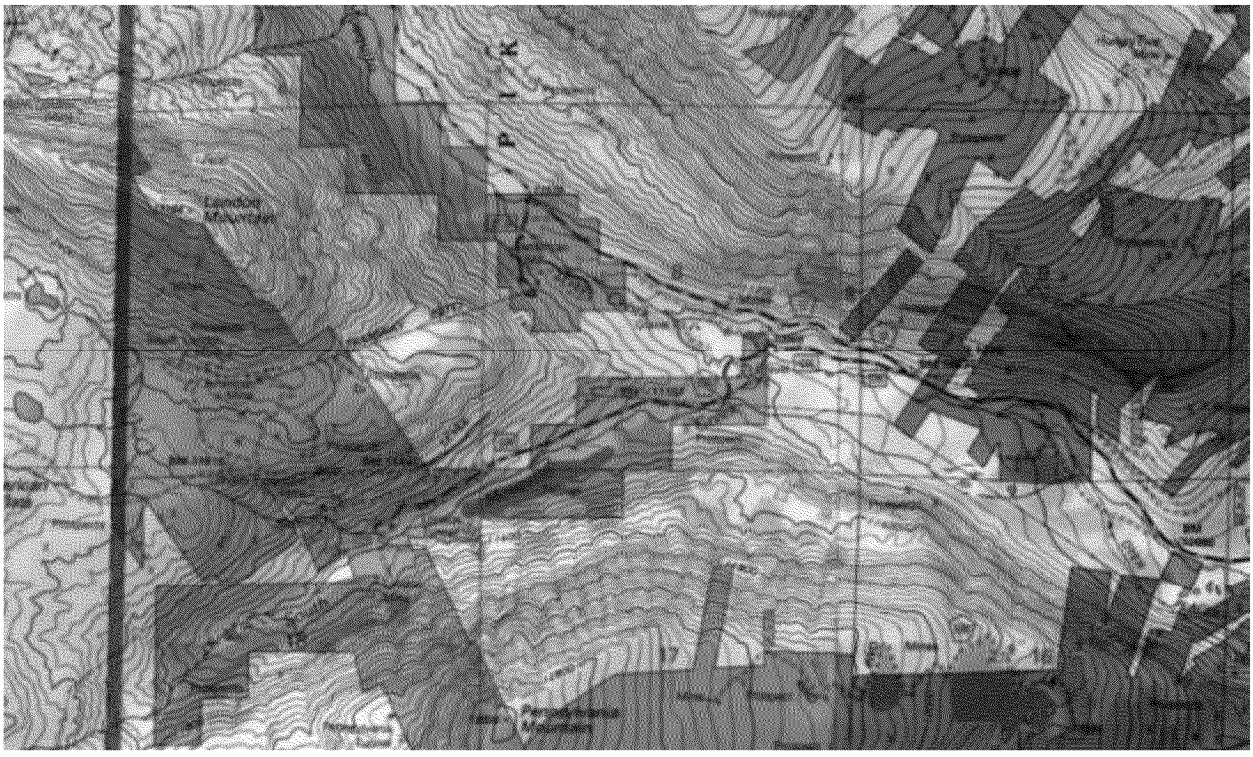


Figure 1: London Mine Location Map. Alma is four miles to the east. Leadville is eight miles to the west, over Mosquito Pass.

Project Site Characterization

In June of 2011 and May of 2012, high flow water samples, including springs and seeps emanating from the tailings, were collected. Students from the Environmental Learning for Kids program participated and assisted in the May 2012 event. In September of 2011, low flow water sampling was completed. Also, the tailings piles were assessed using x-ray fluorescence and solids samples were collected for laboratory analysis in order to assist in bracketing the pollutant sources. In October 2012, the tailings piles were drilled and surveyed to quantify volumes and characterize geotechnical conditions. A monitoring well was drilled and completed into bedrock just north of the tailings. Asbestos screening of

London site buildings was competed. DRMS staff historians and contractors will complete a cultural resource survey when the London site becomes accessible following snowmelt in 2013.

Figure 2: London Mine Water Sampling Locations

Engineering and Design/Implementation

The London tailings reclamation can most efficiently be completed over two construction seasons, in 2013 and 2014. Site investigations indicate that tailings fill the natural bed of South Mosquito Creek, and that the creek has been relocated to route along the north edge of the tailings. The preferred reclamation alternative for the London tailings 2013 project area (Figures 3 & 4) includes removal of tailings adjacent to the relocated creek down to creek level and consolidation into the impoundment constructed in the 1980s (known as the "Elephant Trap"). The consolidated tailings will then be banked against the north flank of Pennsylvania Mountain to maximize separation of the tailings from the relocated creek. Structural fill imported to the project area from permitted gravel sources at or near Alma or Fairplay will be placed over tailings as capping material and to maintain the relocated creek in its current configuration, and plant growth medium will be applied over the cap. A mix of wetland, riparian, and upland vegetation zones will be established in the excavated area and over the consolidated and capped tailings.

An existing stream crossing on the northeast corner of the Elephant Trap will be modified to accommodate equipment entering the project area. Currently a 48-inch corrugated steel pipe, 12 feet long passes South Mosquito Creek under the crossing. The crossing will modified in order to allow equipment to safely enter the site. The crossing will be returned to its pre-existing condition upon completion of the project.

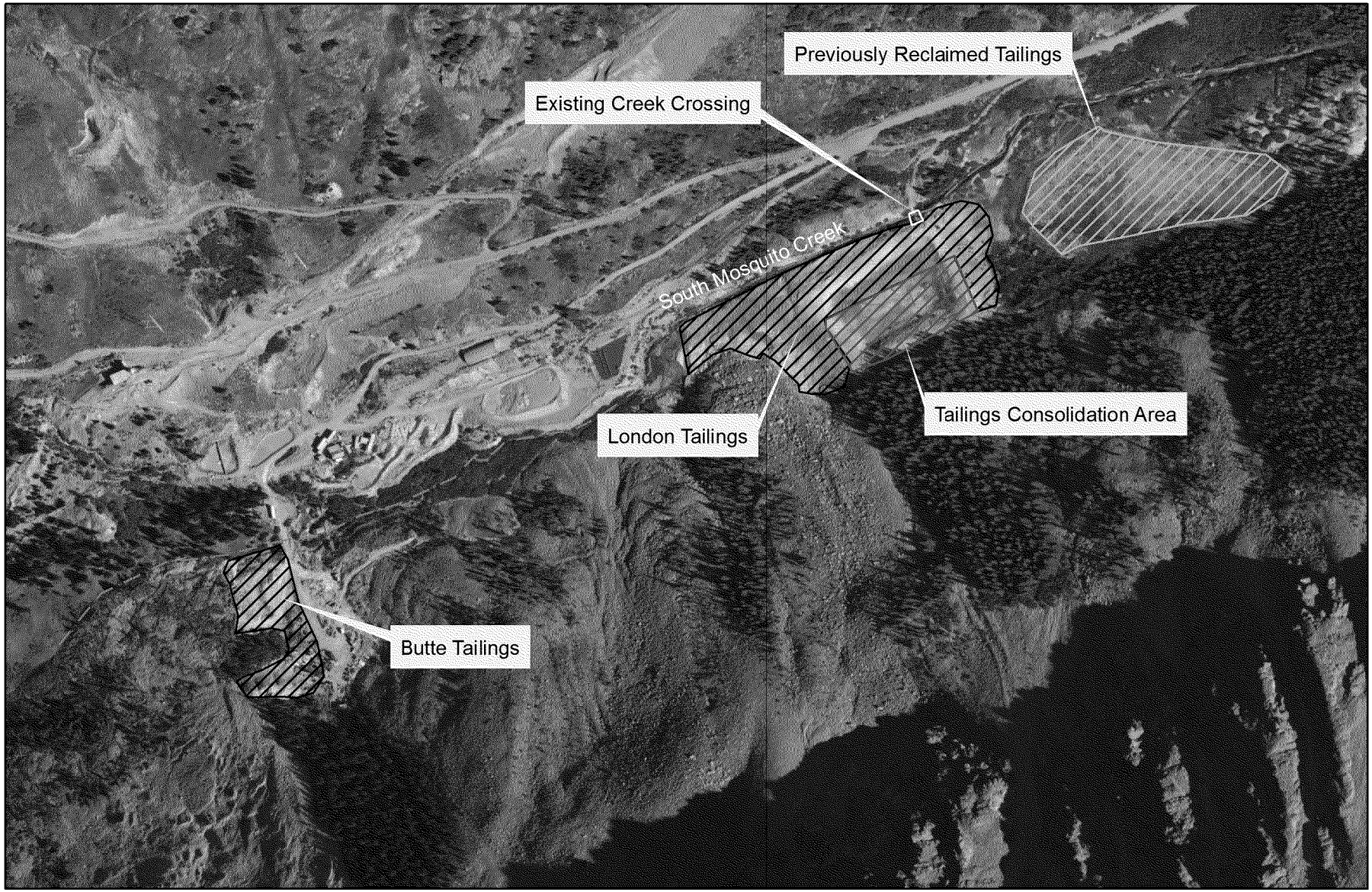
ELK – Environmental Learning for Kids, at the London Mine, May 2012

Figure 3: Proposed 2013 London Project Area


Figure 4: Aerial of Proposed 2013 London Project Area

Project Partnerships

Funding for the London Mine project is by a water pollution control revolving fund grant through Water Quality Control Division, severance tax allocated by the Colorado legislature to revisit and complete reclamation of under bonded permit revocation mine sites, and private donations from Freeport-McMoRan Copper & Gold, Inc.



London Mine Reclamation Project

0 125 250 500 750 1,000
Feet

Division of Reclamation Mining and Safety
1313 Sherman Street, Room 215
Denver, CO 80203
303-866-3567
March 12, 2013